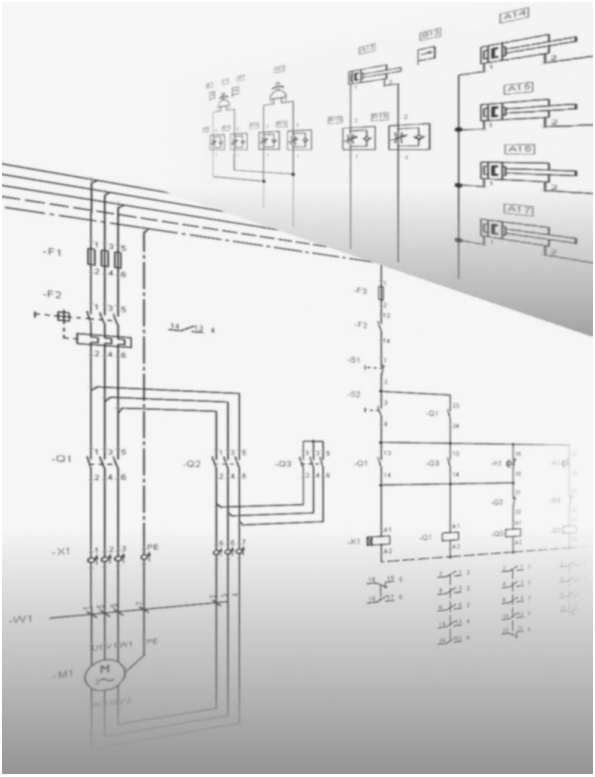
FESTO

FluidDraw® P5

User's Guide



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FluidDraw P5 is an application for creating electro-pneumatic circuit drawings. Not only are the many standard circuit symbols available, but also all of the components contained in the Festo product catalogue along with their part numbers and technical details. If you have also installed the Festo product catalogue then the current catalogue data is always available in FluidDraw. In addition to its own proprietary file format, FluidDraw also supports DXF files and circuit drawings created with older FluidDraw versions and the FluidSIM pneumatic simulator.

Contents

1.	**First steps**	**9**
1.1	Create a new circuit diagram	9
1.2	Organize symbols, libraries and circuit diagrams	12
1.3	Insert symbol from menu	13
1.4	Symbol libraries	15
1.4.1	Create user library	16
1.5	Circuit files	17
2.	**Library and project window**	**18**
2.1	Change window position	18
2.2	Automatic show and hide	18
3.	**Edit circuit**	**20**
3.1	Insert and arrange symbols	20
3.2	Using the Festo product catalogue with FluidDraw	20
3.3	Connect connectors / ports	24
3.4	Automatically connect connectors	25
3.5	Insert T distributor	27
3.6	Move lines	30
3.7	Define the characteristics of lines	32
3.8	Delete line	34
3.9	Set the properties of the connectors	34
3.10	Define component connector / set T distributor	36
3.11	Delete component connector	37
3.12	Configure a way valve	37
3.13	Configure cylinder	39
3.14	Group symbols	41
3.15	Create macro objects	41
3.16	Delete symbol groups and macro objects	42
3.17	Align symbols	42
3.18	Mirror symbols	42
3.19	Rotate symbols	43

3.20	Scale symbols	44
4.	**Drawing frame**	**46**
4.1	Editable labels	46
4.2	Use a drawing frame	47
4.3	Page dividers	51
5.	**Additional tools for creating drawings**	**54**
5.1	Drawing tools	54
5.1.1	Grid	54
5.1.2	Alignment lines	54
5.1.3	Object snap	55
5.1.4	Rulers	56
5.2	Drawing levels	56
5.3	Cross-references	58
5.3.1	Create cross-references from symbols	60
5.3.2	Cross-reference representation	60
5.3.3	Manage cross-references	61
5.4	Drawing functions and graphical elements	62
5.4.1	Interruption/Potential	64
5.4.2	Conduction line	66
5.4.3	Line	68
5.4.4	Polyline (set of connected lines)	70
5.4.5	Rectangle	71
5.4.6	Circle	73
5.4.7	Ellipse	74
5.4.8	Text	76
5.4.9	Image	76
5.5	Check drawing	78

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6. Manage Product Database 79

7. Manage Translation Tables 87

8. Dimension 95

8.1 Draw dimension 95
8.2 Settings for the dimension 96

9. Equipment identifications and designation conventions 98

9.1 Renumber Designations 100

10. Component attributes 105

10.1 Component attributes in the *Properties* dialog window 106
10.2 Identification 108
10.3 Catalog Properties 111
10.4 User Defined Properties 111
10.5 Drawing Properties 113
10.6 Main and secondary components 114
10.7 Linking main and secondary components 114
10.8 Link solenoid valves and solenoid coils 116
10.9 Attributes of the text components 120
10.10 Link text components with attributes 123
10.11 Text components with specified links 125
10.12 Change the properties of multiple objects simultaneously 126
10.12.1 Drawing Properties 126
10.12.2 Main Component 128

11. Parts list management and analyses 130

11.1 Display parts list 131
11.2 Find components from the parts on the circuit diagram 131
11.3 Set parts list properties 133
11.4 Export parts list 135

12. Manage projects 137

12.1 Create new project 137
12.2 Project nodes 138
12.2.1 Project archiving 138
12.3 Circuit and parts list nodes 139
12.4 Unplaced objects 140

13. Circuit and project properties 143

13.1 Attributes 144
13.1.1 Predefined placeholders 146
13.2 Page Dividers 147
13.3 Basic Unit Length 147
13.4 Language 148
13.5 Encryption 149
13.6 Designation Conventions 151
13.7 Cross Reference Representation 152

14. Special functions for electric circuits 153

14.1 Potentials and conduction lines 153
14.2 Cables and wiring 155
14.2.1 Manage cables 161
14.2.2 Insert cable map 162
14.2.3 Insert cable list 164
14.3 Terminals and terminal strips 167
14.3.1 Set terminals 167
14.3.2 Set multiple terminals 169
14.3.3 Create terminal strips 171
14.3.4 Manage terminal strips 172
14.4 Terminal diagram 174
14.4.1 Set links 176
14.5 Contact images 180

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15. Circuit input and output 183

15.1 Print circuit diagram and parts list 183
15.2 Import DXF file 185
15.3 Export circuit 185

16. Options 187

16.1 General 187
16.2 Save 188
16.3 Folder Locations 189
16.4 Language 190
16.5 Dimension 191
16.6 Designation Conventions 192
16.7 Cross Reference Representation 193
16.8 Connector Links 194
16.9 Warnings 195
16.10 Automatic Updates 196
16.11 Text Sizes 197

17. Menu overview 198

17.1 File 198
17.2 Edit 201
17.3 Insert 204
17.4 Draw 206
17.5 Page 207
17.6 Project 208
17.7 View 209
17.8 Library 212
17.9 Tools 213
17.10 Window 214
17.11 Help 215

18. Functional diagram 216

18.1 Edit Mode 217

18.1.1 Set diagram properties 217
18.1.2 Table textboxes 218
18.1.3 Adjust the presentation of the diagrams 220
18.2 Draw diagram curve 222
18.3 Insert signal elements 223
18.4 Insert text boxes 224
18.5 Draw signal lines and insert signal connections 226
18.5.1 Free-draw signal lines 226
18.5.2 Drawing signal lines from signals 227
18.5.3 Draw signal lines from diagram support points 228
18.6 Insert additional signal lines 228
18.7 Insert row 229
18.8 Delete row 229
18.9 Additional editing functions 229
18.9.1 Zoom 229
18.9.2 Undo editing steps 229

Index **231**

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First steps

Chapter 1

1.1 Create a new circuit diagram

⇢ Select the New / File... menu item from the File menu.

An empty circuit diagram window opens in which you can insert symbols and connect them with lines. You should set the diagram size in advance.

⇢ Select the Paper Size... menu item from the Page menu.

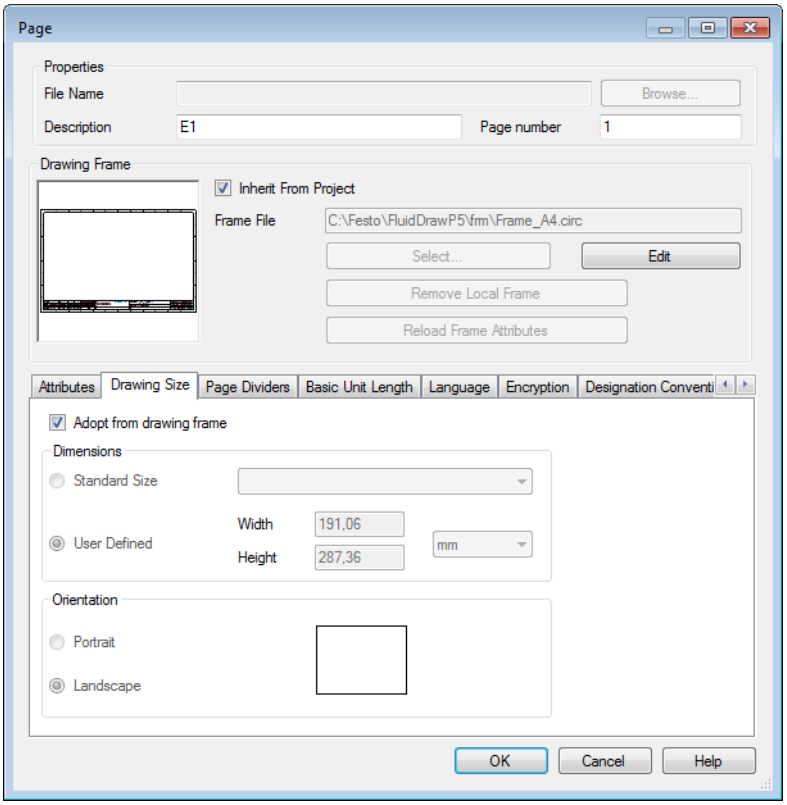

Figure 1/1: Page dialog window, *Drawing Size* tab: setting the drawing size

If you use a drawing frame then FluidDraw can automatically adjust the paper size. If you wish to manually define the drawing size then deactivate the "*Adopt from drawing frame*" option and select the drawing's desired dimensions and orientation. If the drawing's dimensions are larger than your printer's printing area then you can distribute your drawing across several pages (tiles).

To retain a better overview you can create attributes for every circuit drawing.

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⇢ Click the "*Attributes*" tab.

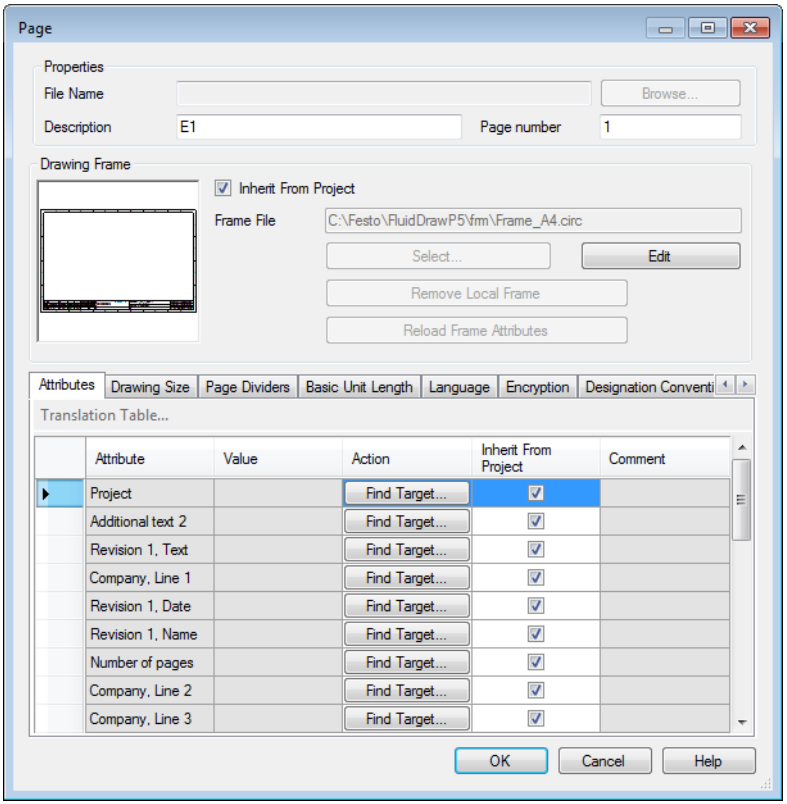

Figure 1/2: Page dialog window, *Attributes* tab: creating attributes

The attribute table allows you to save any desired data in the form of attribute value pairs. The associated placeholders (attributes with the same name) in the drawing frame are replaced by the values entered.

You can also access this dialog window directly by using the Page menu and the Properties... menu item.

1.2 Organize symbols, libraries and circuit diagrams

In order to support the organization of the different document types in FluidDraw all of the circuit files are assigned to one of three groups.

Symbols

Symbols are formal, abstract models providing a graphical representation of the function of a component or component group. This can consist of simple circuit symbols or entire circuits. Symbols can be inserted into their own circuits and linked between the connecting points. The insert can be performed either via the Insert menu or via drag and drop from a library window. Symbols can be compiled into library files with the **lib** file suffix.

Libraries

Libraries are hierarchically organized collections of symbols. In addition to the standard library, which users cannot modify, users can compile any desired number of their own libraries. You can find functions for organizing the libraries on the Library menu as well as on the context menu of the currently active library. To switch libraries use the tab in the upper margin of the library window. Library files have the **lib** file suffix.

Circuits

The default location for circuits is in the **FluidDraw** folder contained in the My Documents folder defined by the operating system. These have the **circ** file suffix.

Note: It is worthwhile to create a new sub-folder in the **FluidDraw** directory for every customer or every project.

1.3 Insert symbol from menu

To find a specific symbol you can either enter characteristic key words in the *Find Symbol* dialog windows or navigate through the hierarchical structure.

⇢ Where necessary open a new window and select the Find Symbol Description... entry on the Insert menu.

The *Find Symbol* dialog window then opens. You can enter your search terms in the "*Search*" input line. Separate the individual search terms using commas or spaces. Neither the order of the search terms nor upper or lower case letters have any influence on the search results.

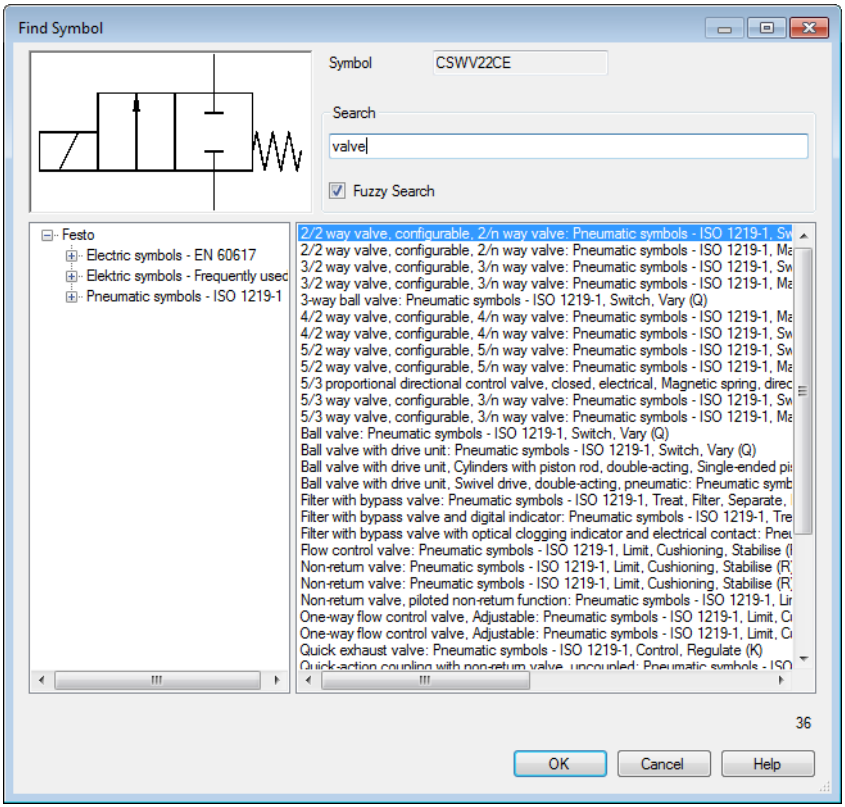
Find Symbol
Symbol
CSWV22CE
Search
valve
Fuzzy Search
Festo
Electric symbols - EN 60617
Elektric symbols - Frequently usec
Pneumatic symbols - ISO 1219-1
2/2 way valve, configurable, 2/n way valve: Pneumatic symbols - ISO 1219-1, Sw
2/2 way valve, configurable, 2/n way valve: Pneumatic symbols - ISO 1219-1, Ma
3/2 way valve, configurable, 3/n way valve: Pneumatic symbols - ISO 1219-1, Sw
3/2 way valve, configurable, 3/n way valve: Pneumatic symbols - ISO 1219-1, Ma
3-way ball valve: Pneumatic symbols - ISO 1219-1, Switch, Vary (Q)
4/2 way valve, configurable, 4/n way valve: Pneumatic symbols - ISO 1219-1, Ma
4/2 way valve, configurable, 4/n way valve: Pneumatic symbols - ISO 1219-1, Sw
5/2 way valve, configurable, 5/n way valve: Pneumatic symbols - ISO 1219-1, Sw
5/2 way valve, configurable, 5/n way valve: Pneumatic symbols - ISO 1219-1, Ma
5/3 proportional directional control valve, closed, electrical, Magnetic spring, direc
5/3 way valve, configurable, 3/n way valve: Pneumatic symbols - ISO 1219-1, Sw
5/3 way valve, configurable, 3/n way valve: Pneumatic symbols - ISO 1219-1, Ma
Ball valve: Pneumatic symbols - ISO 1219-1, Switch, Vary (Q)
Ball valve with drive unit: Pneumatic symbols - ISO 1219-1, Switch, Vary (Q)
Ball valve with drive unit, Cylinders with piston rod, double-acting, Single-ended pis
Ball valve with drive unit, Swivel drive, double-acting, pneumatic: Pneumatic symb
Filter with bypass valve: Pneumatic symbols - ISO 1219-1, Treat, Filter, Separate,
Filter with bypass valve and digital indicator: Pneumatic symbols - ISO 1219-1, Tre
Filter with bypass valve with optical clogging indicator and electrical contact: Pneu
Flow control valve: Pneumatic symbols - ISO 1219-1, Limit, Cushioning, Stabilise (I
Non-return valve: Pneumatic symbols - ISO 1219-1, Limit, Cushioning, Stabilise (R
Non-return valve: Pneumatic symbols - ISO 1219-1, Limit, Cushioning, Stabilise (R
Non-return valve, piloted non-return function: Pneumatic symbols - ISO 1219-1, Lir
One-way flow control valve, Adjustable: Pneumatic symbols - ISO 1219-1, Limit, Cu
One-way flow control valve, Adjustable: Pneumatic symbols - ISO 1219-1, Limit, Cu
Quick exhaust valve: Pneumatic symbols - ISO 1219-1, Control, Regulate (K)
36
OK
Cancel
Help

Figure 1/3: *Find Symbol* dialog window

You can see the symbols found in the two results lists. The library hierarchy is displayed on the left-hand side although only those branches appear which contain matching symbols. An alphabetical list of the search hits is displayed on the right-hand side. The symbol of the highlighted entry is shown in the preview. Once you have found the symbol that you were looking for, you can select it using the OK button or by double-clicking on the appropriate row in the results list. The symbol then “hangs” on the mouse pointer and is placed by left-clicking on the drawing area.

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With the *Fuzzy Search* option you can activate a tolerance in order to achieve results despite minor typing errors or spelling variants.

In addition to the option of inserting a specific symbol using the *Find Symbol* dialog window you can also insert a real component along with its part number and technical details from the Festo product catalogue. You can find details of how to use the Festo product catalogue with FluidDraw underUsing the Festo product catalogue with FluidDraw.

1.4 Symbol libraries

FluidDraw is capable of managing multiple libraries, each of which is displayed in a tab in the library window. Libraries which cannot be modified in FluidDraw are labeled with a lock symbol in the tab. This applies to standard library as well as to symbol folders which FluidDraw does not manage itself or for which the registered user does on possess write authorization.

Every library is displayed hierarchically. Every hierarchy level can by shown or hidden by clicking on the group name. Right-clicking in a library opens a context menu offering the following menu items for editing the library:

View	Defines the size of the symbols displayed. Small, Normal and Large are available.
Expand All	Opens all of the hierarchy levels.
Collapse All	Closes all of the hierarchy levels.

There are three types of library:

The standard library	This library is delivered with FluidDraw and cannot be modified.
Symbol folders	Circuit and symbol files saved on the disk can be used as libraries in FluidDraw. The files from the selected folder are added as a library via the Library menu and the Add Existing Symbol Fold-

er... menu item. The library hierarchy corresponds exactly to the folder hierarchy. These libraries cannot be modified in FluidDraw. The files must be modified directly.

User libraries

You can create and subsequently edit new libraries via the Library menu and the Add New Library... menu item (see section Create user library). Using drag and drop you can move the symbols and groups within the library as desired.

1.4.1 Create user library

In order to be able to access frequently used symbols (or circuits) more quickly multiple symbols can be compiled into libraries. Libraries are saved as files with the **`lib`** file suffix. You can create new libraries using the Library and the Add New Library... menu item. Right-clicking in the new library opens a context menu with which you can modify the library.

The following options are available:

Copy	Copies the selected symbols to the clipboard
Paste	Inserts the symbols into the library from the clipboard. These symbols can also be partial circuits.
Delete	Removes the selected symbols from the library.
Rename...	Edits the text which libraries display below the symbol.
Add Existing Symbols...	Opens a dialog window for selecting symbol files to be copied into the library as new symbols.
Copy to Other Library	Copies the selected symbols into another library. The available libraries are listed in a submenu. Only the currently open libraries are displayed here (appearing as tabs in the library window) which are not write-protects (recognizable as no lock symbol is displayed).

New Sub-Folder...	Creates a new hierarchy level below the active group. The active group is the one belonging to the area below the mouse point and can be recognized by the dark blue colouring.
Remove Sub-Folder	Removes the hierarchy level which the mouse pointer is located in.
Rename Sub-Folder...	Enables you to rename the hierarchy level which the mouse pointer is located in.

1.5 Circuit files

FluidDraw circuit files have the **`circ`** file suffix and are saved as compressed XML files. An option in the *Save* tab under the Options... menu item from the Tools menu allows you to deactivate this compression so that the circuit files can be viewed as plain text. This can be useful for version management software, for example.

However, please note that editing a **`circ`** file outside FluidDraw can cause the file to become unreadable or corrupted upon re-import.

Chapter 2

2.1 Change window position

The library window is anchored on the left-hand side by default and the project window (when a project is open) is on the right-hand side.

To separate the window from the anchor move the mouse pointer to the upper margin. Click and hold the left mouse button. Move the window a small distance towards the center of the screen. Now release the left mouse button. Now you need to move the library window to the lower right and the project window to the lower left. Once a window has been separated from the anchor it can be moved freely.

To re-anchor the window move the mouse pointer to the upper margin. Click and hold the left mouse button. Move the window as far as possible to the right or the left. Now release the left mouse button. This window snaps into place. This enables you to anchor the library window to the right and the project window to the left, for example. You can also anchor both windows on the same side. In this case you can move the desired window into the foreground by clicking the associated tab.

2.2 Automatic show and hide

The tabs offer an additional, practical function: Automatically showing and hiding the library or project window. Click the associated vertical tab "*Library*" or "*Project*" at the edge of the window. This causes the window to be hidden providing a larger area for the drawing. In order to make the window visible again move the mouse pointer over the tab; the window opens once again. As soon as you have performed your operations in this window and move the mouse pointer to a circuit window the library window and / or

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the project window are automatically hidden. To deactivate the function click the associated tab again (this then appears depressed).

Edit circuit

Chapter 3

3.1 Insert and arrange symbols

You can insert symbols into the symbol window being edited using the dialog window *Find Symbol* and by means of the libraries. You can also transfer objects from every other window by selecting them and dragging them to the desired window. Alternatively you can also utilize the clipboard by selecting the items, choosing the Copy menu item on the Edit menu, bringing the target window into the foreground and selecting the Paste menu item on the Edit menu. Using the mouse pointer to drag objects from one window to another copies them. Dragging the objects from one position to another within a window moves them. In order to copy within a window you need to hold down the Shift key while moving the mouse pointer. You can recognize operation by the shape of the mouse pointer. During a move-operation a cross with arrows appears, when copying a plus symbol also appears in the lower right-hand corner of the cross.

3.2 Using the Festo product catalogue with FluidDraw

The standard FluidDraw installation already contains all of the products from Festo. That is why an extract from the Festo product catalogue is installed in multiple languages.

Note: In order to remain up to date, we recommend always installing the latest product catalogue. FluidDraw recognizes more current versions of the catalogue and uses these for the product search.

There are two basic options for inserting symbols with part numbers and technical details in the circuit.

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Via symbol search (Insert menu and Find Symbol Description... menu entry) or from the FluidDraw library window

If you wish to insert a symbol from the FluidDraw symbol library, simply select a graphical image which represents the function of a component or component group. For the majority of the symbols there is a large number of different products with different part numbers and technical details (attributes and parameters). To select a product open the *Properties* dialog window by right-clicking the symbol and click the Find... button.

About the Festo product catalogue

The product catalogue represents a complete database of the available Festo products. If you wish to insert the associated symbols with part numbers and technical details for certain products then select the From Festo Catalog... menu item from the Insert menu. The *Insert from catalog* dialog window appears. Enter your key words in the "*Search*" input line. The upper table contains the search result. Highlighting a row there displays the associated symbol in the preview. Select a product by double-clicking a table row or using the Add to Selection button. Selected products are collected in the lower table. When leaving the dialog window the symbols of the selected products are inserted into the circuit window. The symbols contain the part numbers and technical details of the previously selected products in the form of attribute value pairs.

If you use a custom product database you can select it in the *Product Database* list box. You can use the selected database in the same way as the Festo product catalogue..

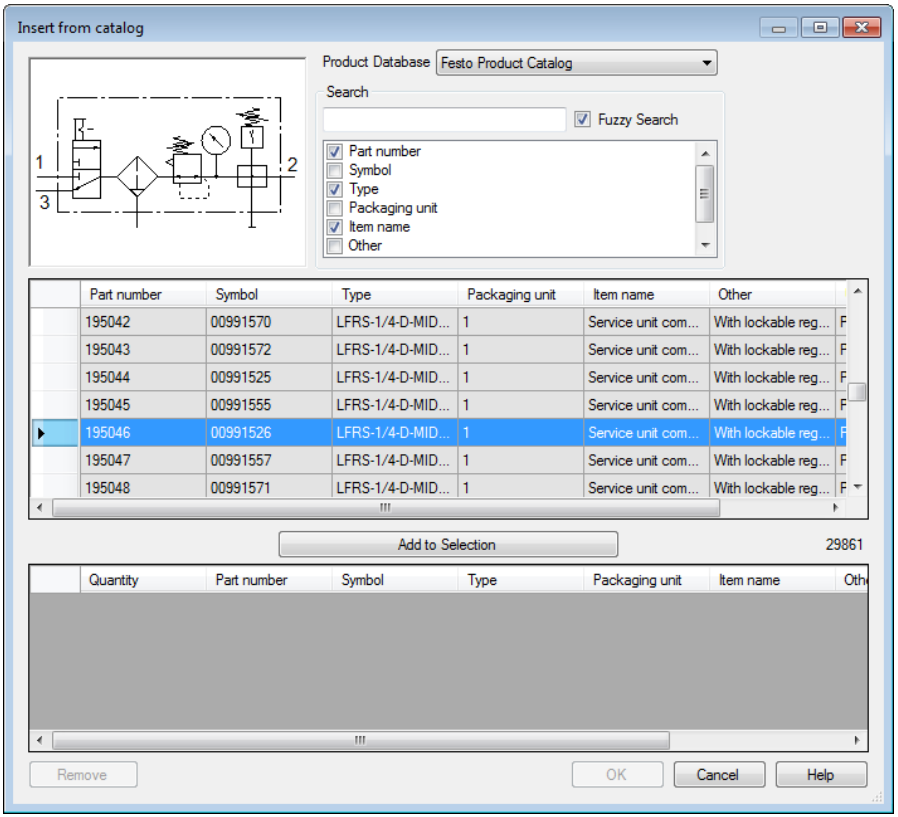

Figure 3/1: *Insert from catalog* dialog window

If you wish to insert one or more symbols from an existing shopping cart select the From Festo Shopping Basket... menu item from the Insert menu.

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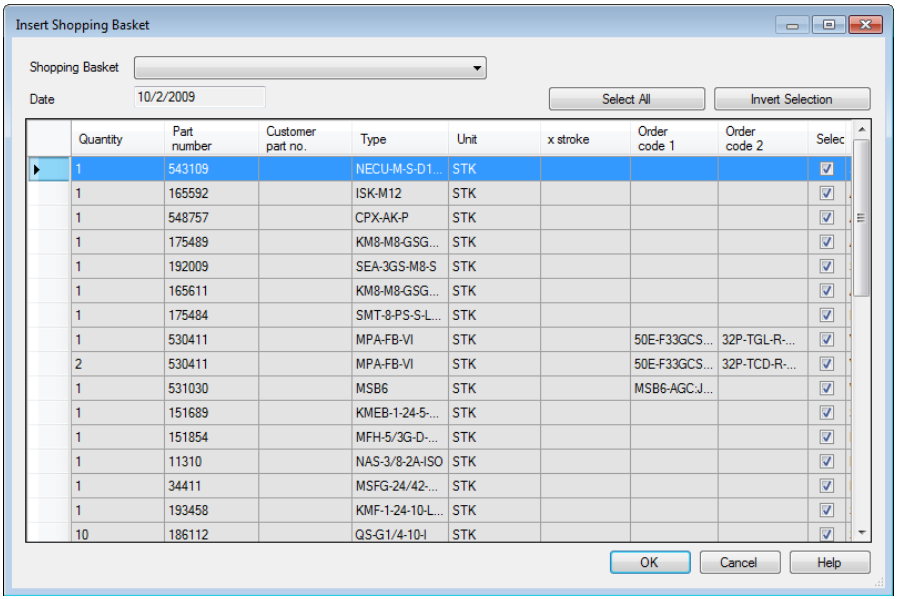

Figure 3/2: *Insert Shopping Basket* dialog window

If you have selected a product which does not possess a graphical illustration then a text appears in the circuit diagram which takes on the component attributes instead of the symbol. Both this text and the identifiers for the symbols appear in the parts list.

You can make the settings that influence the generation of the symbol designations and accessories using the *General* tab under the Options... menu item from the Tools menu. If desired FluidDraw can automatically generate text elements acquired from the type attribute of the associated symbol.

3.3 Connect connectors / ports

In order to connect two component connectors with a line move the mouse pointer to the component connector. You can recognize a connector by the small circle at the end of a symbol's connection line. As soon as you have touched the line the mouse pointer transforms into a crosshair ⌖.

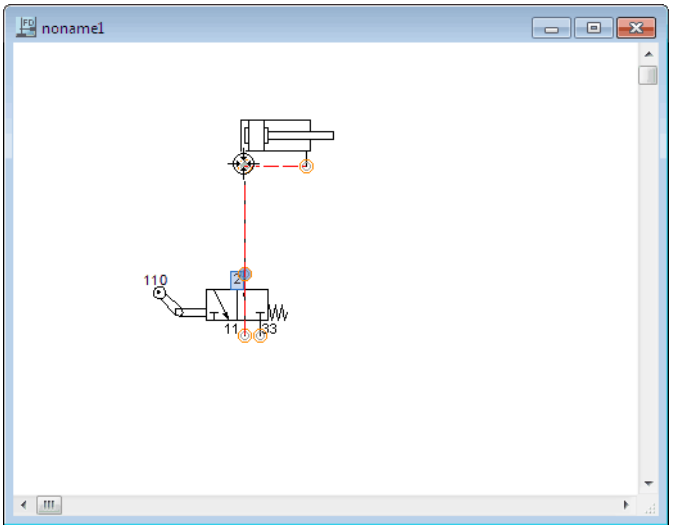

Figure 3/3: Mouse pointer as a crosshair over a component connector.

⇢ Now press the left mouse button and move the mouse pointer to the connector which you wish to connect with the first.

You can recognize when you are over the connector by the shape of the mouse pointer ⌖. If the mouse pointer is over a connector which is already connected to a line then the prohibited sign ⃠ appears and no line can be connected.

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⇢ Release the mouse button once you have touched the second connector.

FluidDraw automatically lays a line between the two connectors.

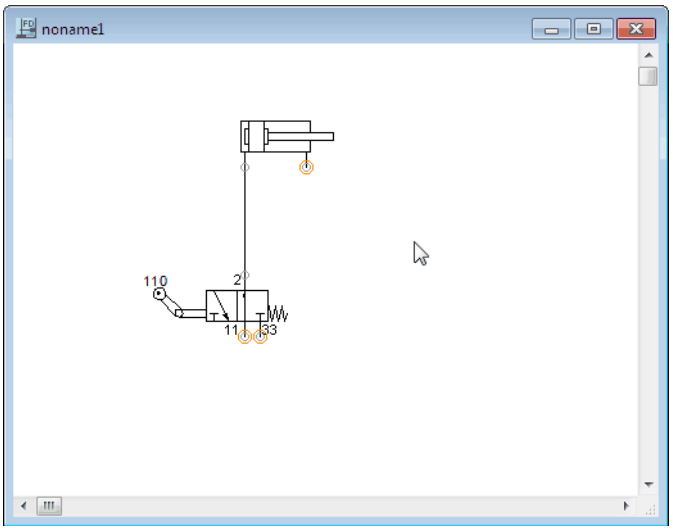

Figure 3/4: Line between two connectors

Support points can be set when dragging lines. To do so simply release the mouse button while dragging the line and click the desired points. The line is completed as soon as you click a second connector or the same point twice. You can cancel the action by pressing the Esc key or the right mouse button.

3.4 Automatically connect connectors

FluidDraw supports two methods of automatically connecting connectors. The first is to drop a symbol on an existing line. To be able to use this method, the symbol must have at least two connec-

tors that precisely fit onto one or more existing lines and the lines that will be produced must not cross the symbol. The following two illustrations show this function.

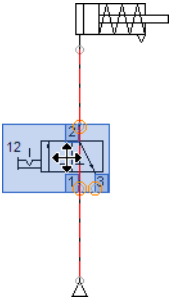

Figure 3/5: Circuit before the connectors are automatically connected

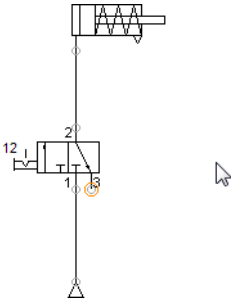

Figure 3/6: Circuit after the connectors are automatically connected

Another method of automatically connecting connectors is to position symbols so that their connectors can be horizontally or vertically connected with free connectors from other symbols. After the symbol has been dropped the corresponding lines are automatically drawn if they do not cross any symbols. The free connectors can also be T distributors.

You can define how different objects' connectors are automatically connected in the *Connector Links* tab under the Options... menu

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item from the Tools menu. The following two illustrations show this function.

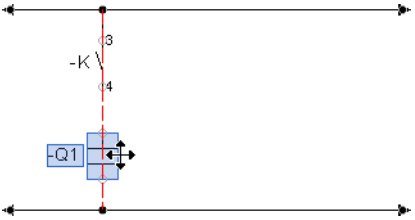

Figure 3/7: Circuit before the connectors are automatically connected

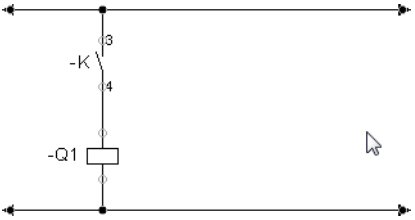

Figure 3/8: Circuit after the connectors are automatically connected

3.5 Insert T distributor

You do not need to utilize a special symbol in order to insert a T distributor. FluidDraw automatically inserts a T distributor when you lay a component connection on a line or lay a line segment to a connection. If you wish to connect two lines then you can also draw one line segment to another; FluidDraw then inserts two T distributors and connects these with a new line.

⇢ Move the mouse points to a connector and press the left mouse button.

As soon as you touch the line the mouse pointer transforms into a crosshair .

⇢ Release the mouse button once you have touched the desired point on the line.

FluidDraw inserts a T distributor and automatically lays a line.

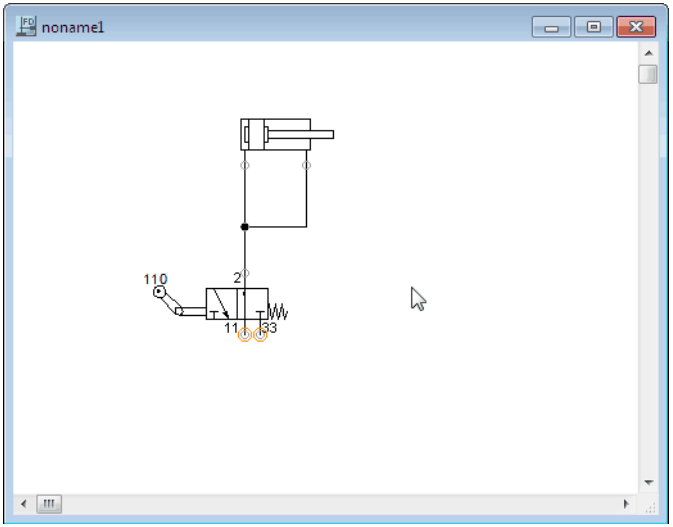

Figure 3/9: Line connection with inserted T distributor

Every T distributor can connect up to 4 lines with each other.

The default representation for the T distributor can be selected via the corresponding T-Stück drop-down list on the toolbar.

You can customize the representation of the T distributor by double-clicking the T distributor or highlighting the T distributor and selecting the Properties... menu item from the Edit menu. The "*Properties*" dialog window opens. Select the "*Representation*" tab.

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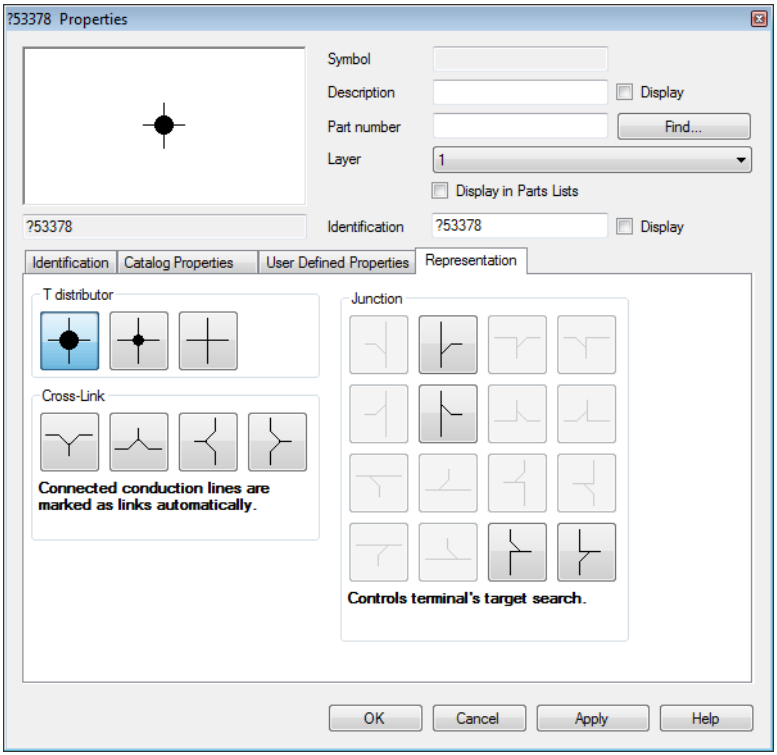

Figure 3/10: T distributor dialog window. Tab: *Representation*

T distributor

Defines the representation of the basic T distributor. Here you can select whether the distributor should be represented as a filled circle or a simple intersection.

Cross-Link

Defines that the T distributor should be represented as an electric link. This representation has a knock-on effect on the connected lines, which are automatically marked as links.

Junction

Defines that the T distributor should be represented as an electric junction. This representation has a knock-on effect on the terminals' target search. With a junction, the target in the direction of a

straight line or right angle is found first and then the target via an angled branch.

3.6 Move lines

Once you have joined two connectors you can then adjust the length of the lines. You can move the line segments in parallel by moving the respective line segment. You can see when you have touched the line on the basis of the line-selection shape ⌖ of the mouse pointer.

⇢ Press the left mouse button and move the line segment orthogonally to the desired position.

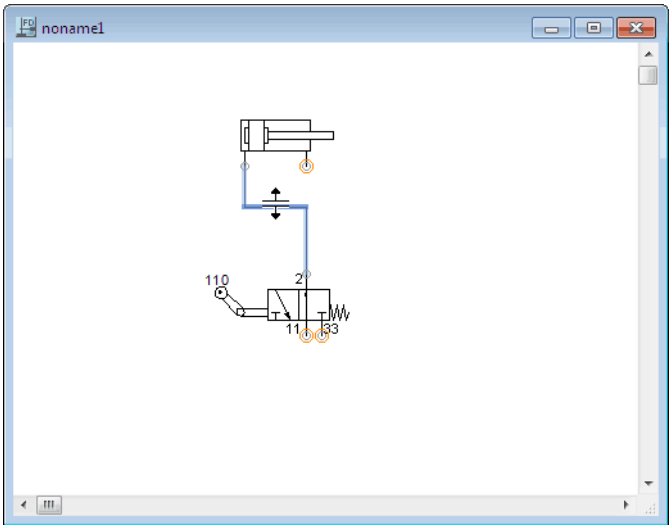

Figure 3/11: Moving a line segment

⇢ Release the left mouse button; FluidDraw adjusts the adjoining line segments in such a way that they remain connected.

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If you move a line segment with is directly connected to a component connector then FluidDraw may insert additional line segments in order to prevent gaps.

If you move a line segment that is horizontally or vertically connected with other line segments via T distributors then these line segments are moved together with the T distributors.

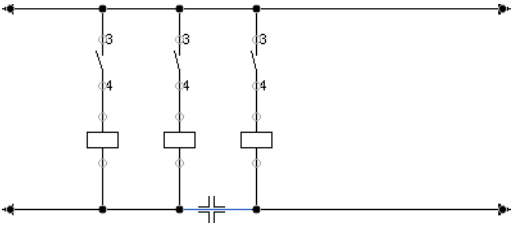

Figure 3/12: Moving multiple line segments

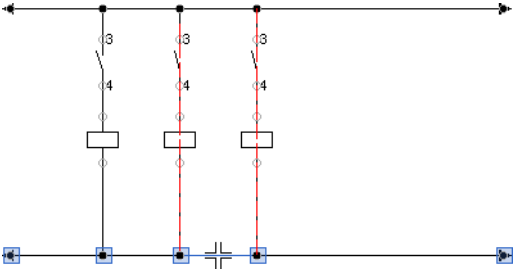

Figure 3/13: Moving multiple line segments

If you only want to move the individual line segment in the case described above then release the mouse button after you highlight the line segment. Click the segment again and move it while keeping the mouse button pressed.

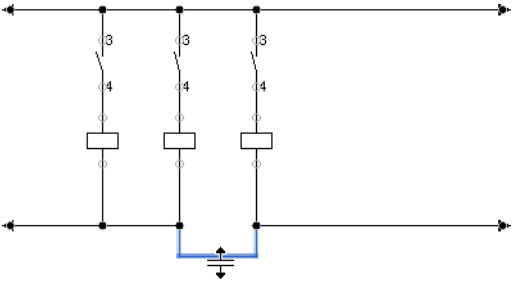

Figure 3/14: Moving an individual line segment

3.7 Define the characteristics of lines

Lines, like other symbols, can be assigned an identification, catalogue properties and user-defined properties. You can find further information on this under Component attributes in the *Properties* dialog window.

You can also define the style, color and drawing layer of the lines by double-clicking a line segment or highlighting the line segment and selecting the Properties... menu item from the Edit menu. The *Line Properties* dialog window opens. Select the *Drawing Properties* tab in this window. The settings are applied to the entire line section as far as the next connector or T distributor.

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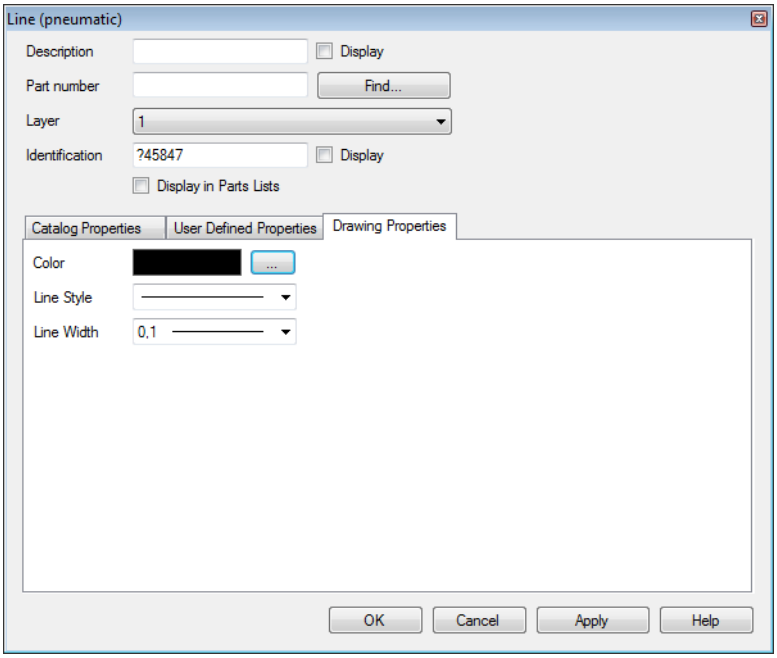

Figure 3/15: *Line Properties* dialog window: defining the properties of a pneumatic or electric line

Layer	Sets the drawing layer of the line.
Color	Sets the color of the line.
Line Style	Sets the line style of the line.
Line Width	Sets the line thickness of the line. Note: Working lines are typically displayed as solid lines, pilot lines as dashed lines.

3.8 Delete line

To delete a line you can either highlight an associated line segment and press the Del key or select the Delete menu item from the Edit menu or highlight a component connector and press the Del key. In these cases it is the line rather than the connector itself that is deleted.

If you delete a T distributor which three or four lines are attached to then all of the lines are deleted. If, on the other hand, only two lines are connected then only the T distributor is deleted and the two lines combined into one.

3.9 Set the properties of the connectors

You can assign a component connector an identification and a blanking plug or silencer by double-clicking on the connector or by selecting the connector and choosing the Properties... menu item on the Edit menu. The *Connector* dialog window then opens.

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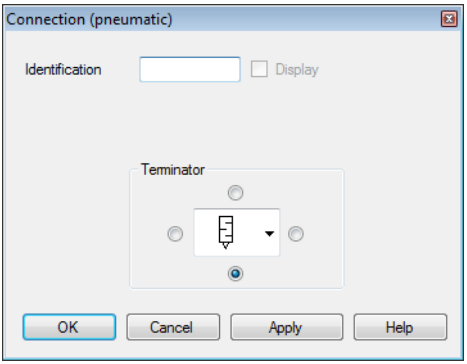

Figure 3/16: *Connector* dialog window: Set the properties of a connector

Identification

You can enter a text identifying this connector into the input line. If the *Display* option is activated then the identification is displayed in the circuit diagram.

Whether or not the identification is actually displayed depends on the option selected under Show Connector Descriptions.

Terminator

Open the symbol list containing connector terminators by clicking the button using the arrow. Select a suitable silencer or a blanking plug.

Note: Please note that this symbol list is only available if a line is not connected to the connector in question. If you wish to connect a line to a sealed connector you first have to remove the blanking plug or silencer. To do this select the empty field in the symbol list with the connector terminators. The alignment of the connector terminator can be set via the radio buttons.

3.10 Define component connector / set T distributor

You can set T distributors on existing lines or define a new component connector by selecting the Define Connector... menu item from the Insert menu. FluidDraw then switches to a special mode in which the next mouse click sets a T distributor or defines the new connector. You can cancel the action by pressing the Esc key or the right mouse button.

Connectors in symbols can be set at any desired position.

Note: To set the connector precisely at the desired position we recommend zooming the display window in closely to the relevant symbol As soon as the mouse pointer is over a symbol the mouse pointer converts into a cross-hair ⌖. Left-clicking sets the new connector.

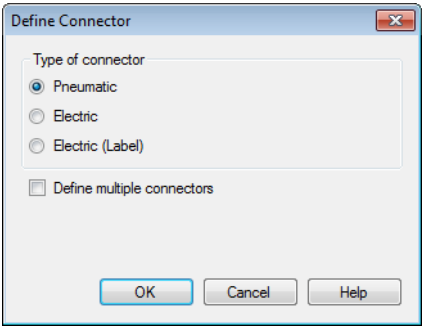

Figure 3/17: Define Connector... dialog window

Type of connector

Selects the connector type. The following are available: "*Pneumatic*", "*Electric*" and "*Electric (Label)*".

Define multiple connectors

Multiple connectors can be set one after the other if this option is active. You can cancel the action by pressing the Esc key.

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3.11 Delete component connector

To delete a component connector select this and choose the Delete Connector menu entry on the Edit menu.

Note: Please note that the Delete menu entry or the Del do not delete the connector but rather only one possibly connected line.

3.12 Configure a way valve

If you require a certain valve which you cannot find in the standard FluidDraw library you can create your own valve symbol with the help of the valve editor.

⇢ Insert a 5/n-way valve into a circuit window from the "Standard Symbols / Pneumatic Symbols / Valves / Configurable Way Valves" library.

To set the valve body and the actuation types of the way valves double-click the valve. The dialog window *Properties* then opens. Click the "*Configure Valve*" tab to access the valve editor.

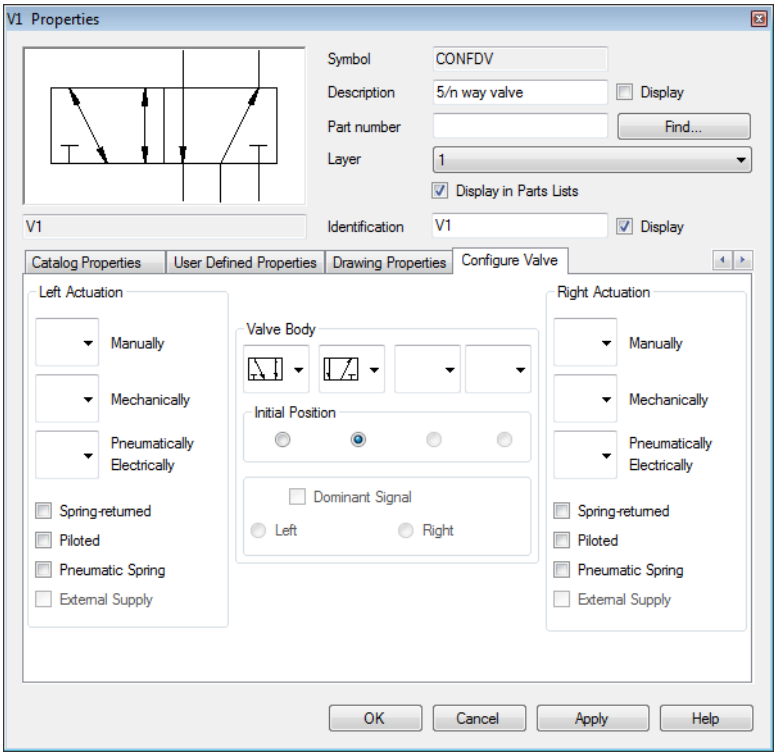

Figure 3/18: *Properties* dialog window: *Configure Valve* tab

Left Actuation – Right Actuation

You can select the actuation types of the valve from the "*Manually*", "*Mechanically*" and "*Pneumatically/ Electrically*" categories for both sides of the valve. Click the button with the mouse pointer and select a symbol element. A valve can have multiple actuation types at the same time. If you do not want an actuation type from a category then select the empty field in the list. You can also define whether each side should have a spring return, pilot control, pneumatic spring or external supply.

Valve Body

A configurable valve can possess a maximum of four switching positions. One valve body can be selected for each switching position. Click the associate button with the mouse points to open the

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	symbol elements list. Select a symbol element for each switching position.. If you want to use less than four switching positions then select the empty field on the list for the positions not required.
Initial Position	Here you set which switching position the valve should use in the normal position. Note: When determining this setting ensure that it does not conflict with a possible spring return.
Dominant Signal	This provides a graphical identification of whether the right or left signal should dominate in the event of equally strong signals.
External Supply	This creates an additional connector for connecting the external supply for the controller.

3.13 Configure cylinder

If you require a certain cylinder which you cannot find in the standard FluidDraw library you can create your own cylinder symbol with the help of the cylinder editor.

⇢ Insert a double-acting cylinder into a circuit window from the “Standard Symbols / Pneumatic Symbols / Pneumatic Drives / Configurable Cylinders” library.

To configure the cylinder double-clock on the cylinder. The dialog window *Properties* then opens. Click the “*Configure Cylinder*” tab. This brings you to the cylinder editor.

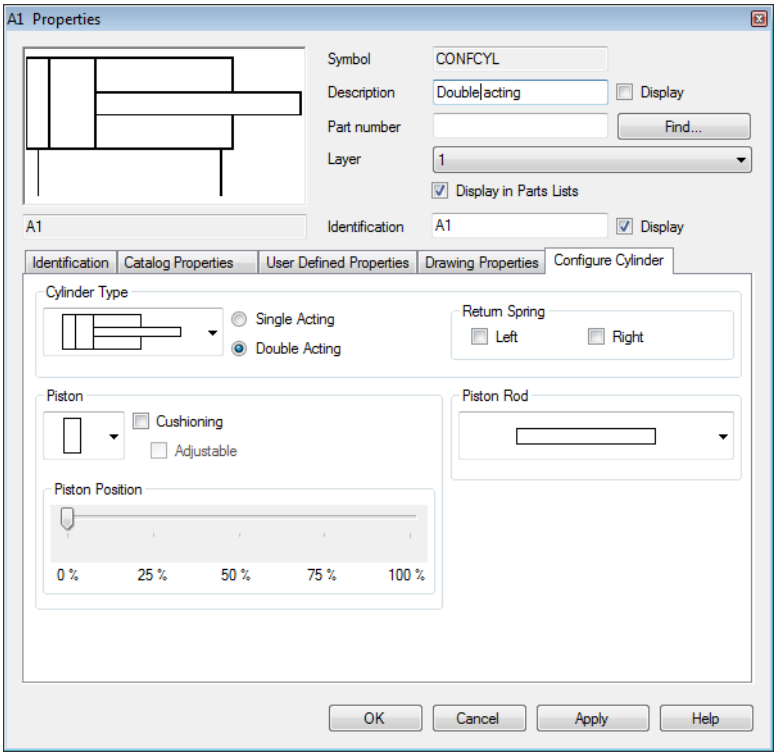

Figure 3/19: *Properties* dialog window: *Configure Cylinder* tab

Cylinder Type

Click the button with the mouse pointer to open the symbol elements list. Select a cylinder type. Set whether the cylinder should be single-acting or double-acting.

Return Spring

Specifies whether a spring for the return should be inserted into the right or left cylinder chamber.

Piston

Click the button with the mouse pointer and select a symbol element for the piston. Set whether the cylinder should possess end position cushioning and whether this should be adjustable.

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Piston Rod	Click the button with the mouse pointer and select a symbol element for the piston rod.
Piston Position	Using the slider you can specify the relative piston position in 25 % steps. 0 % stands for the completely retracted and 100 % extended piston.

3.14 Group symbols

If you wish to combine multiple symbols into a group select these and choose the Group menu item on the Edit menu. Groups can also be nested, i.e. already grouped objects can be grouped again.

A group primarily serves as a drawing aid and does not represent any new components. Every element in a group is included in a parts list in exactly the same way as without being grouped. Double-clicking on a group element opens the dialog window *Properties* of group element clicked.

If you wish to combine multiple symbols into a new component with its own attributes create a macro object.

3.15 Create macro objects

If you wish to combine multiple symbols into a new component with its own attributes then highlight these and select the Create Macro Object menu item from the Edit menu. This creates a new macro object. Macro objects are included in the parts lists as independent components. The original symbols are removed from the parts lists. It is no longer possible to edit their component attributes.

3.16 Delete symbol groups and macro objects

To delete a group or a macro object select the group or the macro object and select the Ungroup/Break Off menu item from the Edit menu. This always deletes the outermost group. In order to delete nested groups you must repeat the operation.

3.17 Align symbols

To align objects with each other, select these and choose the desired orientation from the Align menu item on the Edit menu or click the appropriate button on the toolbar.

3.18 Mirror symbols

The symbols can be both horizontally and vertically mirrored. Select the desired mirror axis from the Mirror menu item on the Edit menu or click the appropriate button on the toolbar. If you select multiple objects at the same time then every object will be mirrored separately. If you wish the operation to use a common mirror axis then group the objects before the operation.

The geometrical properties can be entered directly via the "*Drawing Properties*" tab. Enter a minus sign in front of the corresponding scaling factor in order to mirror the symbol.

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3.19 Rotate symbols

The symbols can be rotated in 90 degree steps or with the help of the mouse pointer. To rotate objects in 90 degree steps, select the desired angle from the Rotate menu item on the Edit menu or click the appropriate button on the toolbar. If you select multiple objects at the same time then every object will be rotated separately. If you wish the operation to use a common axis of rotation then group the objects before the operation.

You can also rotate symbols with the help of the mouse pointer by clicking and dragging the edge of the symbol. In order to do this FluidDraw must be in Enable Rotate mode. This mode can be activated or deactivated using the Enable Rotate menu item from the Edit menu or by clicking the corresponding button on the toolbar.

Note: Activating the Enable Scale mode deactivates the Enable Rotate mode and vice versa.

⇢ In Enable Rotate mode click the edge of the symbol and hold down the mouse button.

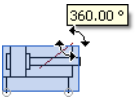

Figure 3/20: Rotate symbol

The current angle of rotation and guides are displayed.

⇢ Hold down the mouse button and move the mouse pointer until the desired angle of rotation is achieved. The angle changes in 15 degree steps.

Note: If you also press the Shift key then you can rotate the symbol steplessly.

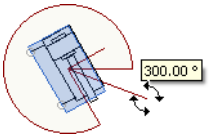

Figure 3/21: Rotate symbol

The angle of rotation can also be entered directly in the properties dialog window in the Drawing Properties tab.

3.20 Scale symbols

The component symbols can be scaled with the help of the mouse pointer. In order to do this FluidDraw must be in Enable Scale mode. This mode can be activated or deactivated using the Enable Scale menu item from the Edit menu or by clicking the corresponding button on the toolbar.

Note: Activating the Enable Scale mode deactivates the Enable Rotate mode and vice versa.

⇢ In Enable Scale mode click the edge or corner of the symbol and hold down the mouse button.

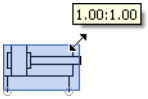

Figure 3/22: Scale symbol

The current scaling relationship to the current original size is displayed.

⇢ Hold down the mouse button and move the mouse pointer until the desired size is reached. The scaling relationship is changed

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in 0.25 steps. Note: If you also press the Shift key then you can scale the symbol steplessly.

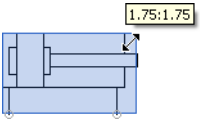

Figure 3/23: Scale symbol

You can simultaneously mirror the symbol by moving the mouse pointer over the middle of the symbol to the opposite side.

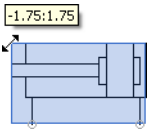

Figure 3/24: Mirror symbol

The scaling factor can also be entered directly in the *Properties* dialog window in the Drawing Properties tab.

Drawing frame

Chapter 4

In FluidDraw drawing frames are “circuit diagrams” which consists of a title block and the frame with the field divisions. They can also be displayed in other circuit diagrams. Existing CAD drawing frames can be imported using theDXF import menu item on the File menu. No order to make a drawing frame usable in different projects and circuit diagrams a number of texts in the title block must be editable. These texts are Author, Creation date, Project name, Page name and Page number, for example. In FluidDraw these aretext components with *Attribute Link*.

4.1 Editable labels

Texts in the title block of a drawing frame are text components. You can use the imported texts or insert new text components at the desired positions. Editable texts are text components with *Attribute Link*. These texts are replaced by the corresponding attribute values of the project and the circuit.

- Double-click a text component to open the *Properties* dialog window.
- Enter the name of the attribute to be linked, e.g. “creator”, in the text field and activate the “*Attribute Link*” option.

Note: You can also use an imported text as an attribute name.

The attribute name is utilized as a placeholder. These attributes are displayed in angle brackets in the “circuit diagram” with the drawing frame. These attributes are replaced by the corresponding attribute values when using the drawing frame in a project or circuit diagrams. Edit the attribute values in the *Properties* dialog window of the project or the circuit diagram. Clicking on a text component of the drawing frame opens the *Properties* dialog window of the project or the circuit which contains the attribute which the text component refers to.

4.2 Use a drawing frame

Drawing frames can be copied into a project and/or a circuit diagram. Insert the drawing frame via the *Properties* dialog window of a project or a circuit.

All of the objects belonging to a drawing frame are inserted into the circuit diagram as a copy. Changing the file with the drawing frame at a later date does not have any effect on the circuit diagram which the drawing frame was inserted into.

When copying the objects belonging to the drawing frame all of the attributes are generated with the drawing frame's text components refer to and which do not exist in the project or circuit.

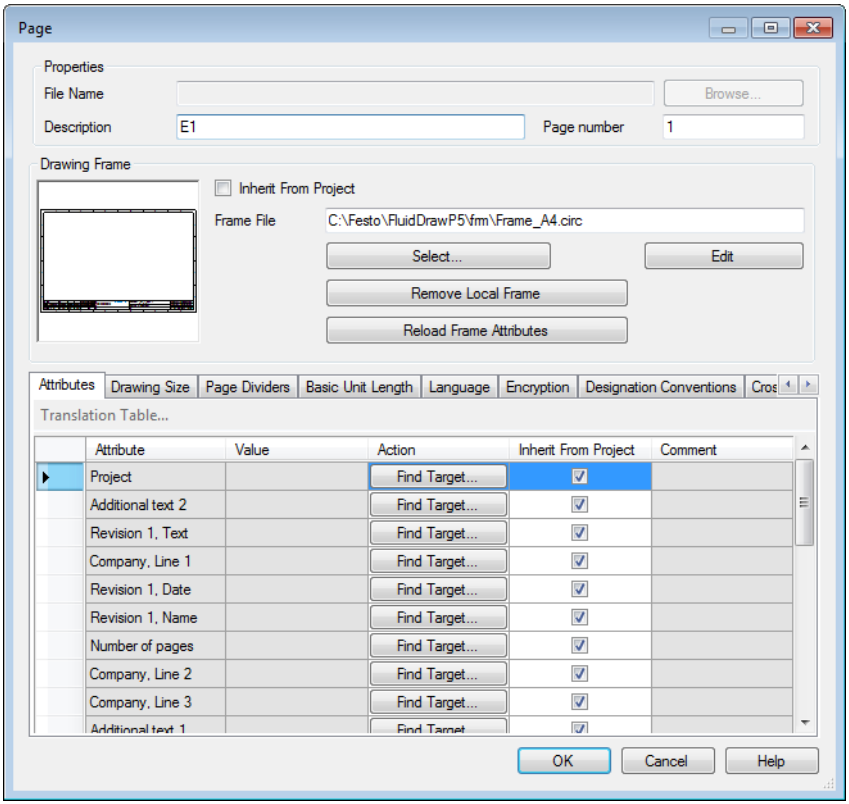

Figure 4/1: Page dialog window: inserting a drawing frame

Inherit From Project

If this option is activated then the drawing frame specified in the project is copied into the circuit. The path and the file used are displayed in the "*Frame File*" line.

Pick...

This button opens a dialog window in which an included frame can be selected. These frame files are located in the **`frm`** directory and are compiled in the project file **`frames.prj`**.

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Edit	Opens the frame file for editing.
Remove Local Frame	Removes the drawing frame from the circuit. The drawing frame's attributes remain attributes of the project or circuit.
Reload Frame Attributes	When inserting a drawing frame the attributes of the text components of the drawing frame are listed. These attributes are saved with the project or the circuit drawing and can be edited and deleted. The Reload Frame Attributes button reloads all of the attributes from the drawing frame, thus updating the attribute list of the project or the circuit drawing.

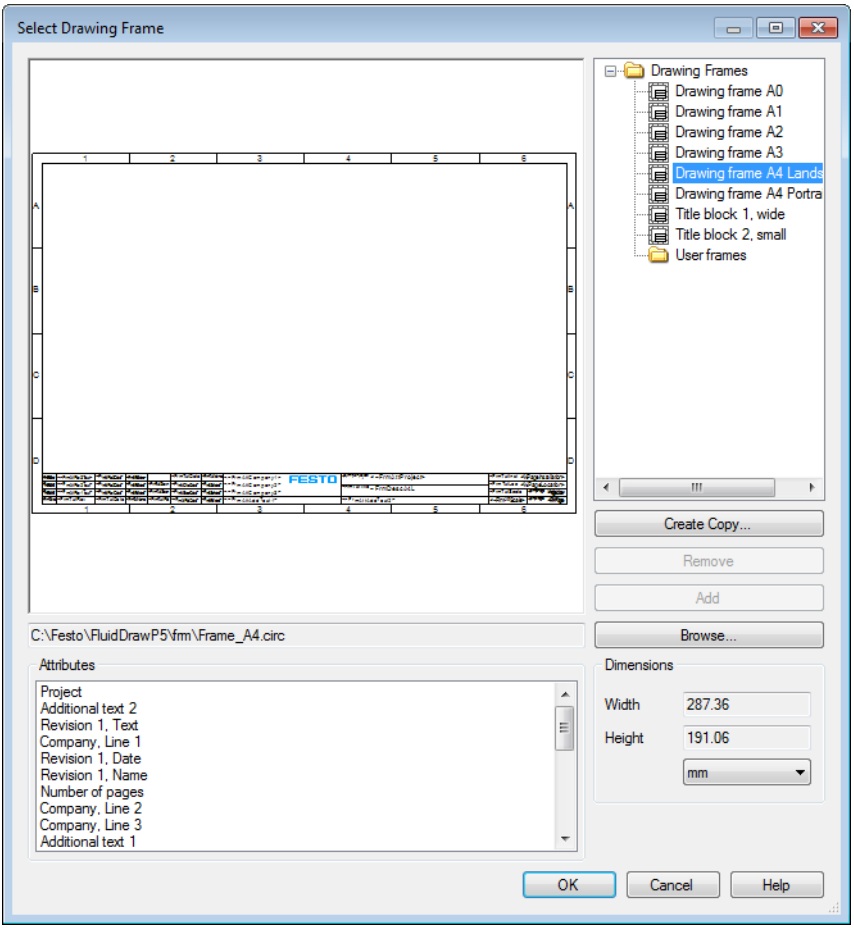

Figure 4/2: *Select Drawing Frame* dialog window

All of the available frame files are displayed as a tree on the right-hand side. The desired drawing frame can be selected in this tree. The drawing frame is then displayed in the preview. In addition the "*Attributes*" list displays all of the attributes of the texts from the drawing frame which were defined as links.

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Browse...	Opens a dialog window to select a circuit file to be used as a frame.

4.3 Page dividers

A circuit diagram or page can be logically divided into rows and columns, which can be labeled with numbers or letters. These page dividers are usually shown in the drawing frame and serve as a means of orientation within the page. Above all they allow the current paths (columns) of contacts to be specified in the contact images.

The graphical representation of the page dividers matches the logical page dividers in the drawing frames provided. The logical page dividers can be shown and hidden via the Show Page Dividers menu item from the View menu or via the button. They are displayed at the left-hand as well as the upper edge of the circuit window.

If the page dividers are visible you can customise them using the mouse so that they match the graphical representation of the drawing frame, for example. This customization can be done in different ways:

- Click and hold the mouse buttons in a column or row to move the entire column or row.

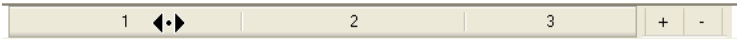

Figure 4/3:

- Click and hold the mouse buttons at the outer margin of a column or row to move the margin of the column or row.

Figure 4/4:

The opposite margin is not moved and the columns or rows are resized proportionally.

⇢ Click and hold the mouse buttons at the margin of an inner division in a column or row to move the margin of the column or row.

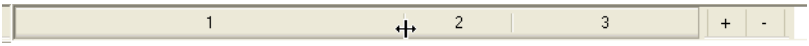

Figure 4/5:

In this case only the adjacent columns or rows are resized.

Columns and rows can be inserted and removed using the + and – buttons.

The label type and the number of rows and columns can be defined using the ... button. The settings are saved as page properties. The following dialog window is opened:

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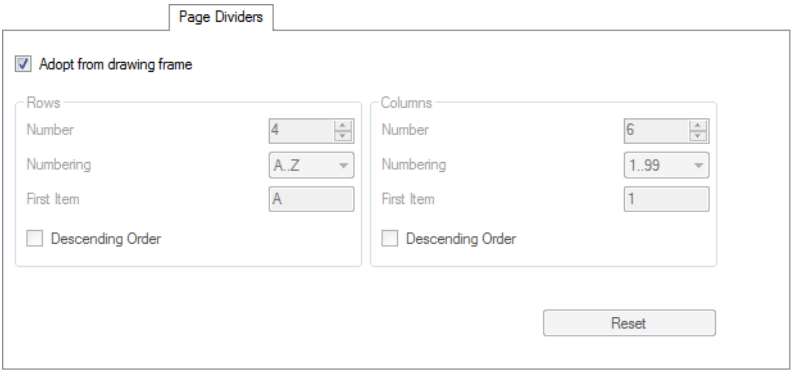

Figure 4/6: Page dialog window, *Page Dividers* tab

Adopt from drawing frame	Selecting this option only makes senses for pages that do not represent drawing frames. This option must be deactivated if the current page represents a drawing frame that is to be inserted into other pages later. If this option is activated then all settings that have been defined in the drawing frame will be adopted.
Rows	Defines the settings for the horizontal rows.
Columns	Defines the settings for the vertical columns.
Number	Defines the number of page dividers.
Numbering	Numbers, lowercase letters or uppercase letters can be used for numbering.
First Item	Defines the first numbering item. The numbering will be continued on analogously from this item.
Descending Order	Changes the numbering order.
Reset	Resets the page dividers to default values.

Chapter 5

5.1 Drawing tools

5.1.1 Grid

For arranging the symbols and laying the lines it is often practical to show a point or line grid. You can activate or deactivate the display of the grid using the Show Grid menu item from the View menu. You can also define further grid settings in the *General* tab under the Options... menu item from the Tools menu.

In order to simplify handling the connectors snap into place when they are close to a grid line. This makes it easier to find the precise position when moving the connectors.

Note: The grid snap function may not be desired as it prevents free positioning. In this case you can hold down the Ctrl key during the moving operation; this temporarily deactivates the grid snap function.

5.1.2 Alignment lines

Connectors between symbols should be exactly horizontal or vertical wherever possible. Then they can be connected with a straight line.

FluidDraw supports the exact positions firstly via thegrid snap and secondly via automatically displaying red alignment lines while moving the selected objects.

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⇢ Open a circuit file which contains multiple objects. Select one of these and slowly move it back and forth above and next to other objects.

Observe the dashed red lines which appear when two or more connectors lie above each other.

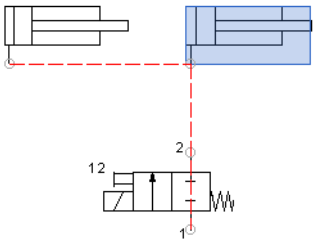

Figure 5/1: Automatically display the alignment lines

In order to simplify handling the connectors snap into place when they are close to an alignment line. This makes it easier to find the precise position when moving the connectors.

Note: The grid snap function may not be desired as it prevents free positioning. In this case you can hold down the Ctrl key during the moving operation; this temporarily deactivates the alignment lines and the grid snap function.

5.1.3 Object snap

Various snap points can be activated for precise drawing. During a drawing operation the mouse pointer snaps into place as soon as it is close to a snap point. The following snap functions are available:

- Snap to Grid
- Snap to Connector

 Snap to End Point

 Snap to Mid Point

Snap to Centre

Snap to Intersection

Press and hold the Ctrl key during a drawing operation to temporarily deactivate the object snap function.

5.1.4 Rulers

The rulers can be shown and hidden via View | Show Rulers.
They are displayed at the left-hand as well as the upper edge of the circuit window.

5.2 Drawing levels

FluidDraw supports 256 drawing levels which can be shown / hidden and locked / unlocked individually. In addition you can also define the color and line thickness for every drawing level. Using the Drawing Layers... menu item on the View menu you can set the properties of the individual layers and also insert a description.

Note: The drawing frame is located on layer “0” by default.

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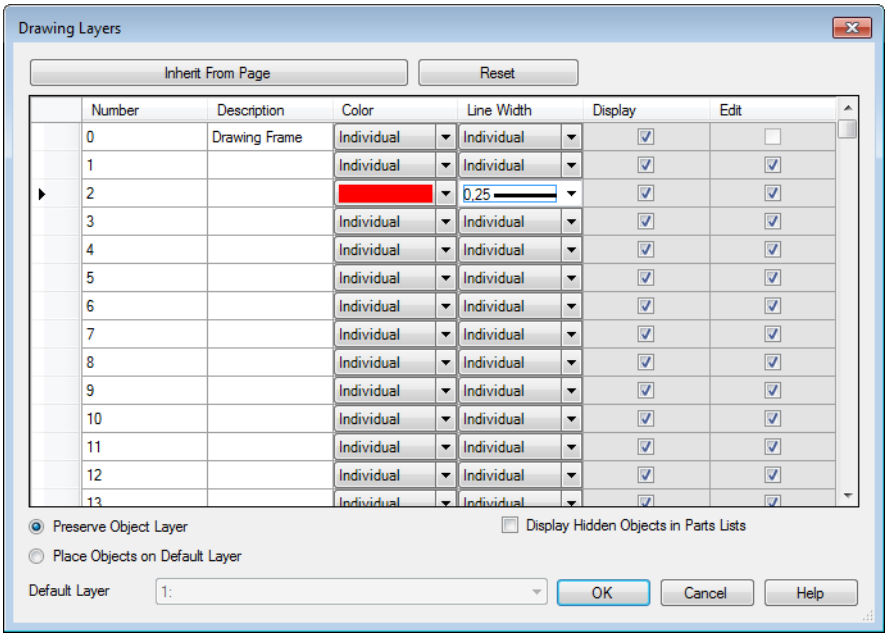

Figure 5/2: *Drawing Layers* dialog window

The drawing layer settings can be copied over as default settings from the current circuit using the Inherit From Page button.

You can select the drawing layer where newly inserted objects should be placed under "*Default Layer*" . If you do not want the symbol layer to be changed when objects are inserted then select the "*Preserve Object Layer*" option.

Objects located on a drawing layer for which the "*Edit*" option is deactivated are visible but cannot be highlighted and therefore neither moved nor deleted. This enables you to lock a drawing frame, for example, if it was inserted manually and not via the *Properties* dialog window for the circuit or project. In order to still be able to edit objects on layers of this type you must activate the "*Edit*" option for the corresponding layer.

Drawing layers for which the "*Display*" option is deactivated are neither visible nor can they be edited.

5.3 Cross-references

Cross-references serve to link connected parts of a circuit drawing when the entire drawing is spread across multiple pages. This allows lines to be interrupted, for example, and continued on another page.

FluidDraw offers two types of cross-references. Paired cross-references consist of two cross-reference symbols that reference each other. The two cross-reference symbols are linked via a unique label that is entered for both symbols.

The option also exists to reference any object within a project from a cross-reference symbol. The cross-reference is uni-directional in this case: from the cross-reference to the target object. This allows several cross-references to reference the same object.

Both types enable you to jump directly from a cross-reference to the associated target. With the paired cross-reference the target is the corresponding cross-reference, otherwise an object.

You jump to the corresponding target either using the Jump to Target button in the properties dialog window for the cross-reference symbol or by highlighting the cross-reference and selecting the Jump to Target menu item from the context menu.

The circuit drawings involved must belong to the same project.

Open the *Cross-reference* dialog window from the Edit menu and the Properties... menu item. Alternatively you can open this dialog window by double-clicking the cross-reference symbol or using the Properties... context menu.

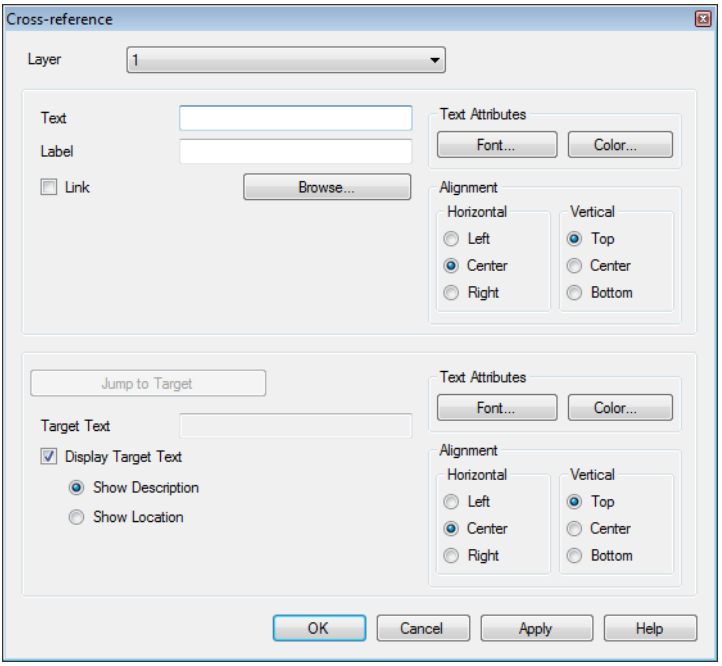

Figure 5/3: *Cross-reference* dialog window

Text	This text is displayed in the cross-reference
Label	Defines the labels via which the linked cross-references are identified.
Link	If this option is activated then the label entered constitutes a link to a target object. The cross-reference only works in the direction of the target object in this case. This option can be combined with the *Show Location* option to show the location of the target object.
Target Text	If the *Show Location* option is activated then the location of the target object will be displayed here. The representation of the location is defined in the *Cross Reference Representation* tab in the properties dialog window for the page or project.

If *Show Description* is activated then the text of the corresponding cross-reference is displayed for paired cross-references, otherwise the description of the target object is displayed.

Display Target Text

If this option is activated then the above-mentioned text from the *Target Text* field is displayed below the text for this cross-reference.

Jump to Target

Activating this button opens the circuit window containing the corresponding cross-reference. The associated symbol is indicated by an animation.

The font type, text color and alignment of the texts to be displayed can also be customized.

5.3.1 Create cross-references from symbols

You can generate a cross-reference from one or more symbols. To do so highlight the corresponding symbols and select the Edit | Create Cross-reference menu item or the Create Cross-reference menu item from the context menu. The highlighted symbols are combined into a group that constitutes a cross-reference with two additional texts. One of these texts shows the label used and the other the target text for the cross-reference.

5.3.2 Cross-reference representation

The location of the target object can be shown in cross-references. How it is represented can be specified in the *Cross Reference Representation* tab in the properties dialog window for the circuit or project. The location can be composed from the "*Page number*", "*Page*", "*Page Column*", "*Page Row*" and "*Object Identification*" components. These reference the target object. Separators can be placed before and after each component. The default representation is:

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/ *Page number*. *Page Column* The description for the page and the page number are specified in the Properties dialog window for the circuit.

The page number is a predefined placeholder that can be used in text components and drawing frames among other things.

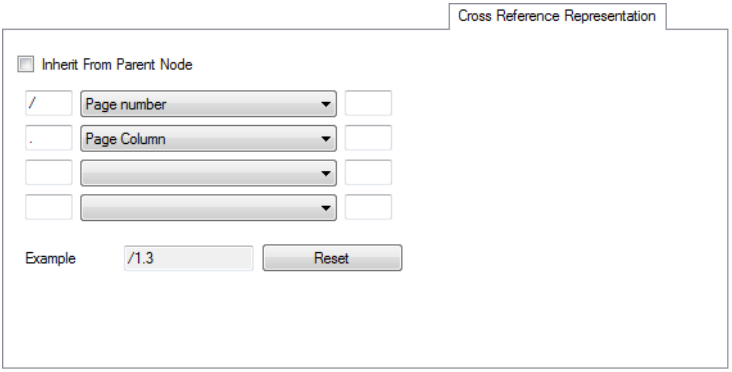

Figure 5/4: *Cross Reference Representation* tab

Inherit From Parent Node	Defines whether the representation rules for the parent node should be applied.
Example	A sample location that conforms to the specified rules is displayed here.
Reset	Resets the cross-reference representation to the default setting.

5.3.3 Manage cross-references

All paired cross-references in a project are listed in a dialog window that is opened using the Project | Manage Cross References... menu item. Using this dialog you can jump to all paired cross-references in the project.

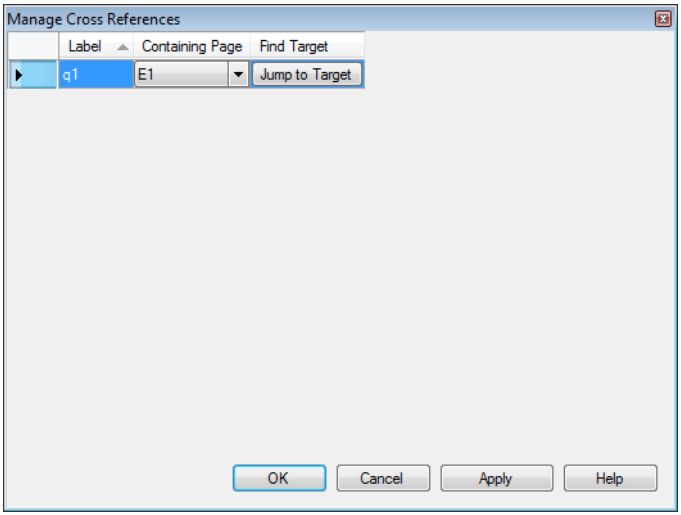

Figure 5/5: Manage Cross References... tab

Label	Contains the label for the corresponding cross-reference.
Containing Page	A page containing the cross-reference in question can be selected in the drop-down list.
Jump to Target	Using this button you can jump to the corresponding cross-reference.

5.4 Drawing functions and graphical elements

Graphical elements can be inserted into a circuit using the Draw menu or by activating the drawing function on the toolbar. In order to prevent you from unintentionally moving other symbols when drawing you enter a special mode for the drawing function in which you can only perform the selected drawing functions. After every drawing operation FluidDraw returns to the normal editing mode. To insert another drawing element you must select the associated

menu item or the corresponding drawing function on the toolbar again.

Note: If you wish to draw several elements in a row without leaving the special drawing mode then you can select the menu item or the corresponding drawing function on the toolbar while holding down the Shift key. The drawing mode then remains active until the menu item or the drawing function is deactivated by selecting it again or another drawing function is selected without the Shift key being pressed.

The drawing functions toolbar contains the following buttons:

Switches to the normal editing mode.

Switches to the mode for drawing a line.

Switches to the mode for drawing a polyline.

Switches to the mode for drawing a rectangle.

Switches to the mode for drawing a circle.

Switches to the mode for drawing a ellipse.

Switches to the mode for drawing a text.

Switches to the mode for drawing an image.

Switches to the mode for drawing a conduction line. You can start by choosing whether you would like to draw a pneumatic or electric conduction line.

The graphical elements are drawn in the color shown.

The graphical elements are drawn in the line style shown.

The graphical elements are drawn in the line thickness shown.

The line beginnings are drawn with the symbol shown.

The line ends are drawn with the symbol shown.

5.4.1 Interruption/Potential

If conduction lines extend over several pages then the line ends can be assigned interruptions. Interruptions can be used to define that a conduction line is only interrupted in the drawing and is continued somewhere else. An interruption can be assigned an identification and linked with another interruption. The location of the linked interruption can be displayed at the source interruption.

If an electric interruption is used with an electric line then this interruption is a potential. The use of electric potentials is described under Potentials and conduction lines.

You can insert an interruption into an existing line or position it freely in a circuit.

⇢ Select the Interruption/Potential... menu item from the Insert menu.

A dialog window opens where you can make various settings for the interruption to be inserted.

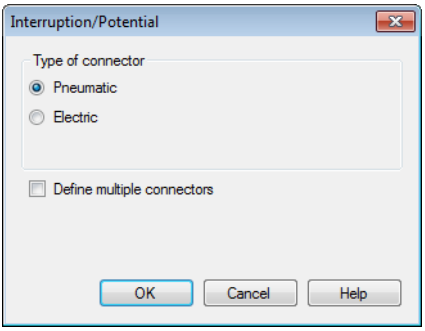

Figure 5/6: Interruption/Potential... dialog window

Type of connector

Defines whether a pneumatic or electric interruption (potential) is to be inserted.

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Define multiple connectors

Multiple interruptions can be set one after the other if this option is active. You can cancel the action by pressing the Esc key.

You can edit the properties for an interruption by double-clicking it. The following dialog window opens.

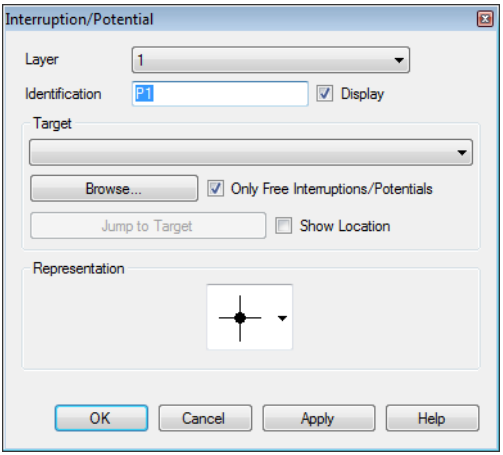

Figure 5/7: *Interruption/Potential* dialog window

Layer

Defines the drawing layer for the interruption.

Identification

Defines the identification for the interruption. The identification will be displayed in the circuit if the *Display* option is active.

Target

Interruptions can reference each other in pairs. The counterpart interruption can be selected from a list or entered directly in the list box. Browse... opens a dialog window where all interruptions are displayed in a tree and can be selected. Only interruptions that are not linked will be shown in the list if the *Only Free Interruptions/Potentials* option is active.

Jump to Target

If the interruption is linked with another interruption then this button can be used to jump to the counterpart interruption.

Show Location	If this option is activated and the interruption is linked with another interruption then the location of the counterpart interruption will be displayed as a page coordinate (e.g. page number/column).
Representation	A symbol that defines the representation of the interruption can be selected from a list. To illustrate the representation the relevant symbol always additionally shows the intersection of two lines.

5.4.2 Conduction line

A conduction line is drawn by defining two end points. A pneumatic or electric line of this type consists of two connectors with a line between them. Both connectors can be used as the starting point for further connections. The conduction lines can only be drawn horizontally or vertically.

You open a dialog window where you can make various settings for the line to be dragged using the Insert | Conduction Line... menu item or the button on the toolbar.

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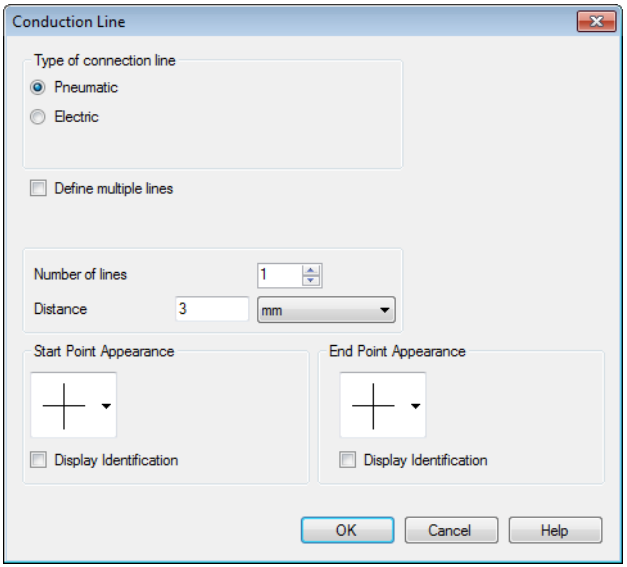

Figure 5/8: Conduction Line... dialog window

Type of connection line

Selects the conduction line type. The following are available: "*Pneumatic*" and "*Electric*".

Define multiple lines

Multiple conduction lines can be set one after the other if this option is active. You can cancel the action by pressing the Esc key.

If multiple conduction lines with the same distance between them are to be drawn horizontally or vertically then change the number in the "*Number of lines*" field. You specify the distance to be maintained between the lines using "*Distance*".

Under "*Start Point Appearance*" and "*End Point Appearance*" you can define the representation of the respective end point. If the "*Display Identification*" option is selected then the identification for the start point is displayed. In order to guarantee that the same identification is displayed for the start point and the end point, a text reference for the start point is displayed for the end point

instead of its identification.Interruptions are used as end points for conduction lines.

After confirming the dialog window you switch to a special mode where you define the end points of the line with two consecutive mouse clicks. Alternatively you can also draw a line by clicking and dragging.

An electric conduction line can constitute a potential line. This is described under Potentials and conduction lines.

5.4.3 Line

A line is drawn by defining two points. In contrast to a conduction line this line is purely a drawing element. As such it can be drawn with any desired angle but does not allow connections with pneumatic or electric connectors.

The line-specific properties can be defined in the *Drawing Properties* tab of the *Properties* dialog window for the line:

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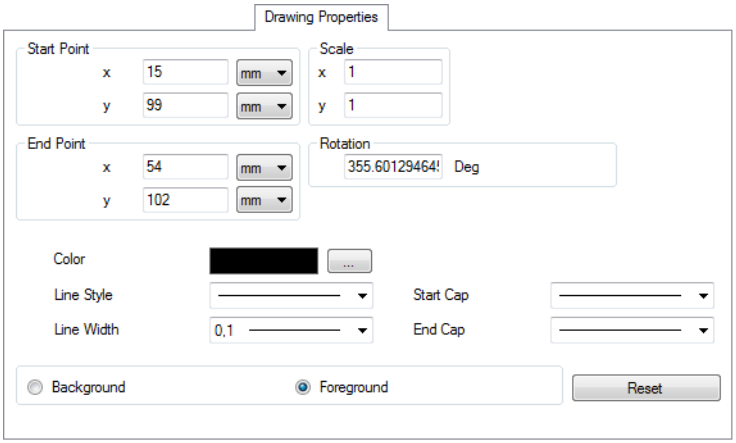

Figure 5/9: *Properties* dialog window for a line: *Drawing Properties* tab

Start Point	Defines the x/y coordinate of the start point.
End Point	Defines the x/y coordinate of the end point.
Scale	Defines the scaling in the x or y direction.
Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Line Style	Defines the line style.
Line Width	Defines the line thickness.
Start Cap	Defines how the beginning of the line is displayed.
End Cap	Defines how the end of the line is displayed.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. For example symbols are not covered by filled drawing elements.

Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. For example symbols are covered by filled drawing elements.
Reset	Reset the settings to the default values.

5.4.4 Polyline (set of connected lines)

A polyline (also called a set of connected lines or polygonal chain) is drawn by defining two or more points. Each mouse click sets a further vertex. The polyline is ended by clicking the same point twice.

The properties of the polyline can be defined in the *Drawing Properties* tab in the *Properties* dialog window:

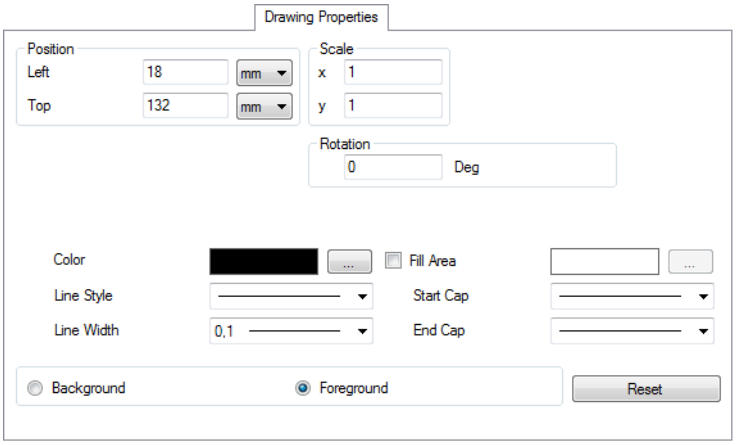

Figure 5/10: *Properties* dialog window for a polyline: *Drawing Properties* tab

Scale	Defines the scaling in x or y direction.

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Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Line Style	Defines the line style.
Line Width	Defines the line width.
Start Cap	Defines how the beginning of the line is displayed.
End Cap	Defines how the end of the line is displayed.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. In particular it means that symbols are not covered by filled drawing elements, for example.
Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. In particular it means that symbols are covered by filled drawing elements, for example.

To change the vertices of a polyline or to set new vertices switch to the “polyline editing mode” by selecting the Edit | Edit Poly Line menu item or activating the button on the toolbar.

You can move the existing vertices by clicking and dragging. The mouse pointer changes to when you mouse over an existing vertex. If the mouse pointer is over a line without a vertex is displayed and a new vertex is inserted as soon as you click.

5.4.5 Rectangle

A rectangle is drawn by defining two diagonally opposite corner points.

The rectangle-specific properties can be defined in the *Drawing Properties* tab of the *Properties* dialog window for the rectangle:

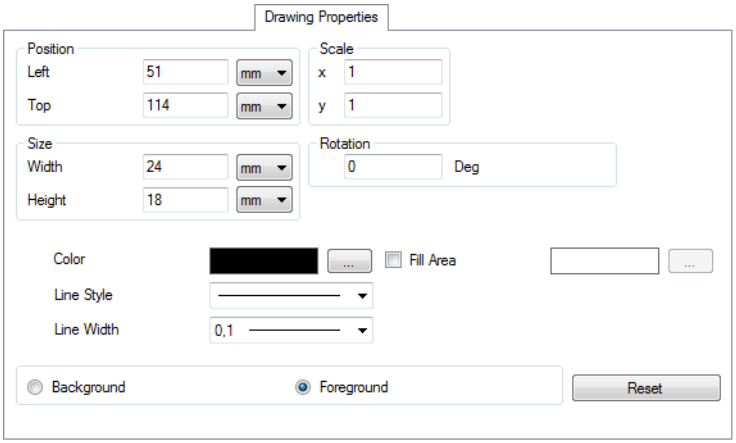

Figure 5/11: *Properties* dialog window for a rectangle: *Drawing Properties* tab

Scale	Defines the scaling in the x or y direction.
Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Fill Area	Fills the rectangle with the color listed.
Line Style	Defines the line style.
Line Width	Defines the line thickness.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. For example symbols are not covered by filled drawing elements.
Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. For example symbols are covered by filled drawing elements.

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5.4.6 Circle

A circle is drawn by defining a middle point and a radius. You can draw a circular arc by subsequently entering the beginning and final angles into the *Drawing Properties* tab in the *Properties* dialog window of the circle.

The circle-specific properties can be defined in the *Drawing Properties* tab of the *Properties* dialog window for the circle:

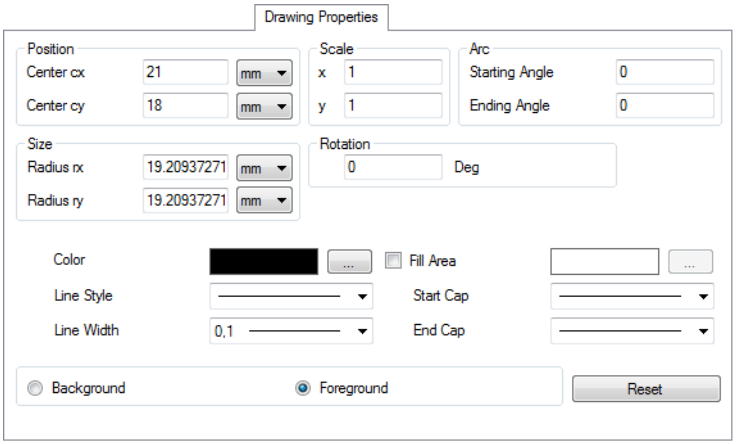

Figure 5/12: *Properties* dialog window for a circle: *Drawing Properties* tab

Scale	Defines the scaling in the x or y direction.
Arc	Defines the starting and final angles of a circular arc.
Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Fill Area	Fills the circle with the color listed.

Line Style	Defines the line style.
Line Width	Defines the line thickness.
Start Cap	Defines how the beginning of the line is displayed.
End Cap	Defines how the end of the line is displayed.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. For example symbols are not covered by filled drawing elements.
Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. For example symbols are covered by filled drawing elements.

5.4.7 Ellipse

An ellipse is drawn by defining a middle point and two radii with parallel axes. You can draw an ellipse by subsequently entering the beginning and final angles into the *Drawing Properties* tab in the *Properties* dialog window of the ellipse.

The ellipse-specific properties can be defined in the *Drawing Properties* tab of the *Properties* dialog window for the ellipse:

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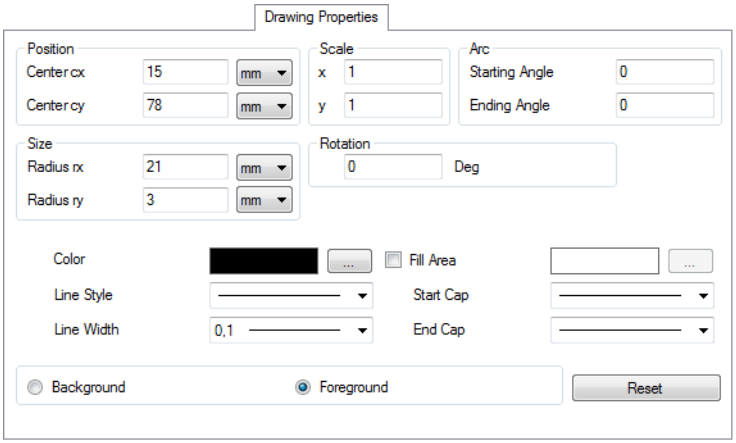

Figure 5/13: *Properties* dialog window for an ellipse: *Drawing Properties* tab

Scale	Defines the scaling in the x or y direction.
Arc	Defines the starting and final angles of an ellipse.
Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Fill Area	Fills the circle with the color listed.
Line Style	Defines the line style.
Line Width	Defines the line thickness.
Start Cap	Defines how the beginning of the line is displayed.
End Cap	Defines how the end of the line is displayed.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. For example symbols are not covered by filled drawing elements.

Foreground

Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. For example symbols are covered by filled drawing elements.

5.4.8 Text

A text is inserted at the position of the mouse pointer by clicking. The dialog window *Properties* for entering the text and setting the attributes then opens.

5.4.9 Image

An image is inserted at the position of the mouse pointer by clicking. The dialog window for selecting an existing image file then opens.

Large background images can massively decrease the processing speed as the screen has to be re-drawn whenever symbols are moved or edited.

The image-specific properties can be defined in the *Drawing Properties* and *Picture* tabs of the *Properties* dialog window for the image:

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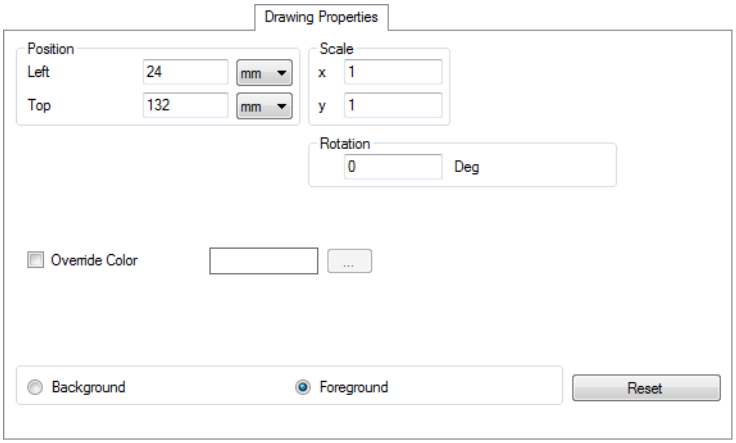

Figure 5/14: *Properties* dialog window for an image: *Drawing Properties* tab

Scale	Defines the scaling in the x or y direction.
Rotation	Defines the angle of rotation in degrees.
Override Color	Defines the color of the drawing element.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. For example symbols are not covered by filled drawing elements.
Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. For example symbols are covered by filled drawing elements.
File	Defines the image file for the image.
External Link	When this option is active FluidDraw only saves a link to the image file. However if this option is deactivated then the image is embedded in the circuit diagram. This is the preferable variant if you wish to pass on or archive the circuit diagram.

5.5 Check drawing

Using the Check Drawing menu item from the Page menu you can have FluidDraw check your drawing for possible drawing errors. FluidDraw displays the following messages where necessary:

- *Duplicated identification labels*
- *Unresolved link targets*
- *Superimposed objects*
- *Lines through connectors*
- *Open connectors*

If messages are displayed then the corresponding objects are selected after confirmation in the dialog window.

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Manage Product Database

Chapter 6

As well as the Festo product catalogue, user-defined product databases can also be managed in a FluidDraw-specific data format. These product databases can be created from new or opened as an existing FluidDraw product database file.

It is also possible to import databases that were not created using FluidDraw. Note that the external databases cannot be maintained in FluidDraw. This must be done using suitable database tools. The product databases are imported as a copy in the FluidDraw-specific data format.

A product or data record contains the attributes "*Supplier*", "*Part number*" and "*Symbol Name*" at least. Each product can be assigned a symbol using the "*Symbol Name*" attribute. You can add any number of other attributes.

The dialog window for managing the product databases is opened using the Tools | Custom Product Databases... menu item.

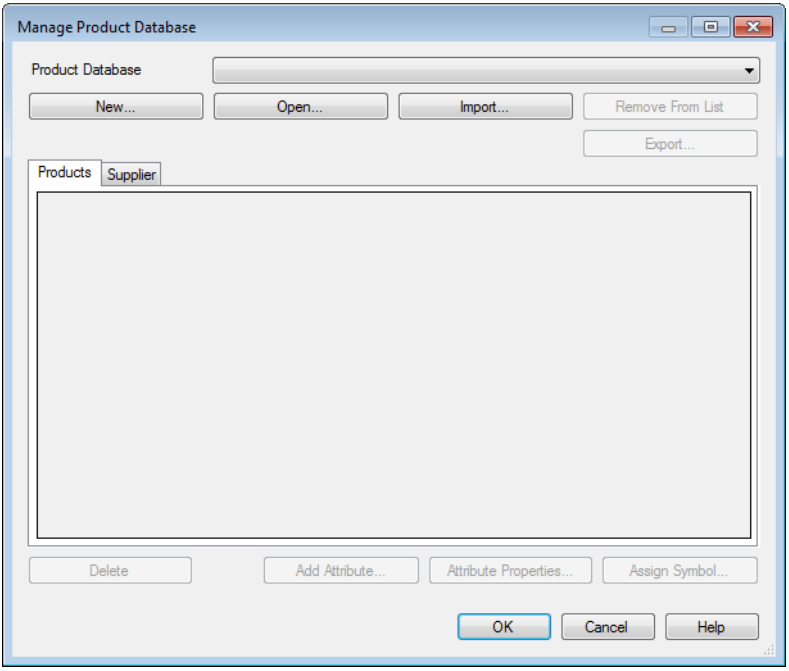

Figure 6/1: *Manage Product Database* dialog window

Product Database	Using this drop-down list you can select the product database that you want to manage.
New...	Using this button you can create a new product database. You will then be asked for a file name under which the product database should be saved.
Open...	Opens a file selection dialog window that you can use to open an existing FluidDraw product database.
Import...	Opens a file selection dialog window that you can use to open an external product database. The database must be in CSV (Comma-Separated Values) format, which most database programs can generate. Further settings for the import are described further below.

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Remove From List	Removes the selected product database from the drop-down list. The associated file is not changed.
Products	This tab displays the product database as a table. The "*Supplier*" attribute features a drop-down list containing all of the suppliers that can be selected. The suppliers are listed in the *Supplier* tab.
Supplier	This tab lists all of the suppliers in the product database. Further suppliers can also be added and provided with additional information.
Export...	Exports the selected table (*Products* or *Supplier*) as a CSV file.
Delete	Deletes the highlighted product from the product database.
Add Attribute...	Further attributes can be added to both the *Products* table and the *Supplier* table.
Attribute Properties...	Opens a dialog window where the attribute properties can be defined. The dialog window is described further below.
Assign Symbol...	Opens a dialog window where you can select a symbol that is assigned to the highlighted product.
	If a file was selected for importing an external product database then various settings can be made using the following dialog window. FluidDraw analyses the CSV file to be imported and suggests useful presettings.

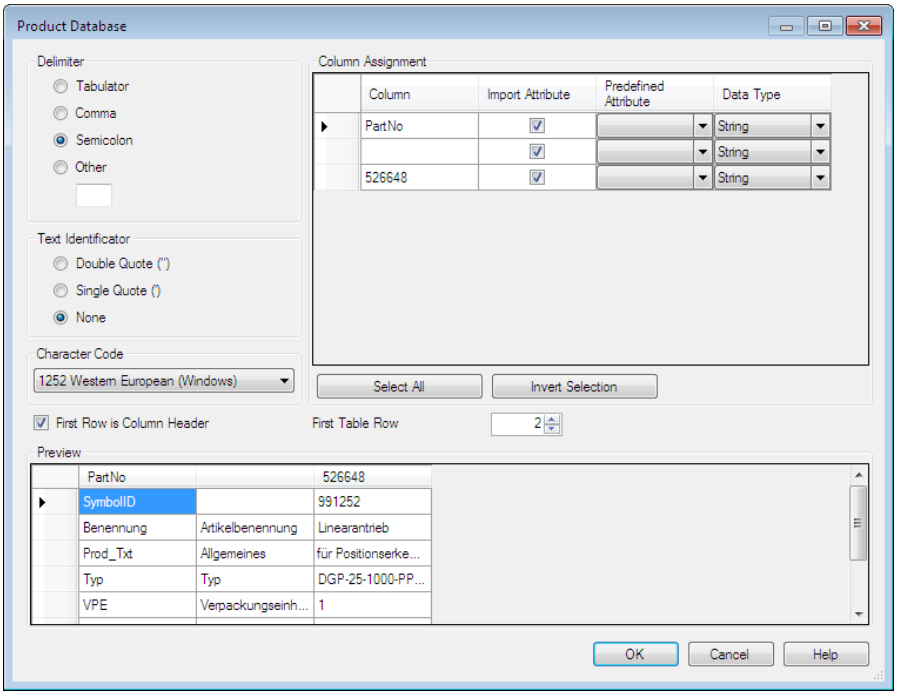

Figure 6/2: *Product Database* dialog window

Delimiter	Defines the delimiter that can be used to differentiate the attributes.
Text Identificator	Defines whether and how quotes have been added to texts.
Character Code	Defines the character set to be used.
Column Assignment	Defines the attributes (columns) to be imported from the database and the attributes predefined in FluidDraw that they should be assigned to. The data type of the attribute can also be specified. You can select all of the attributes using the Select All button and invert the selection using the Invert Selection button.

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First Row is Column Header	Defines that the first row contains the column headers (attribute names).
First Table Row	Defines the row from which the data records are to be imported.
Preview	Displays a preview of the data records that are being imported.

The following dialog window opens if the Export... button was selected to export either the *Products* or *Supplier* table as a CSV file.

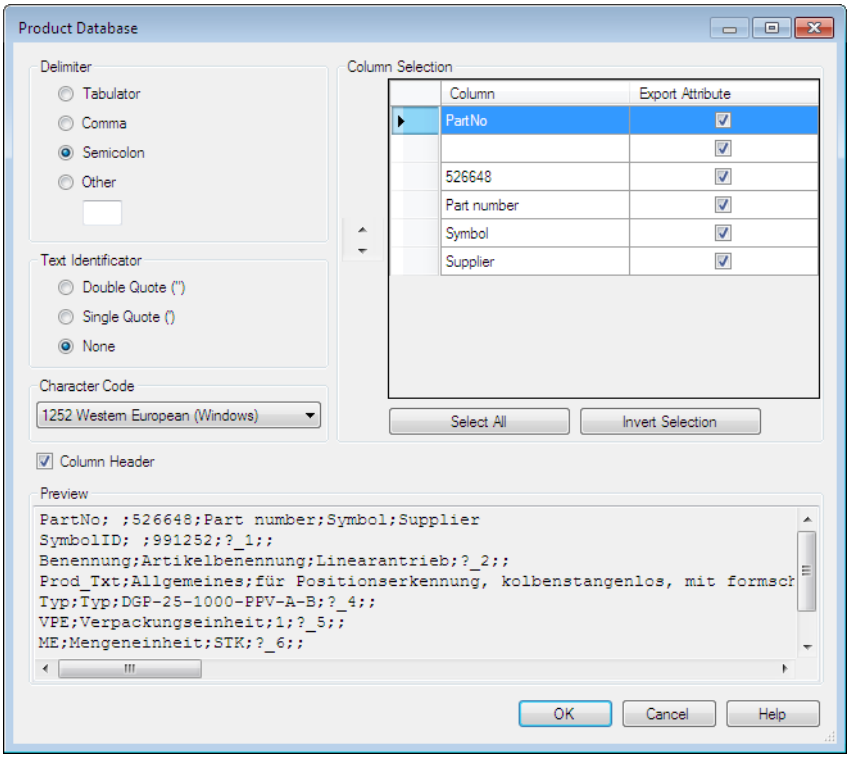

Figure 6/3: *Product Database* dialog window

Delimiter	Defines the delimiter that can be used to differentiate the attributes.
Text Identificator	Defines whether and how quotes are to be added to texts.
Character Code	Defines the character set to be used.
Column Selection	Defines the attributes to be exported. You can select all of the attributes using the Select All button and invert the selection using the Invert Selection button.

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Column Header

Defines whether an additional first row containing the attribute names as column headers should be exported.

Preview

Displays a preview of the data records that are being exported.

Further attributes for the *Products* and *Supplier* tables can be added using the Add Attribute... button.

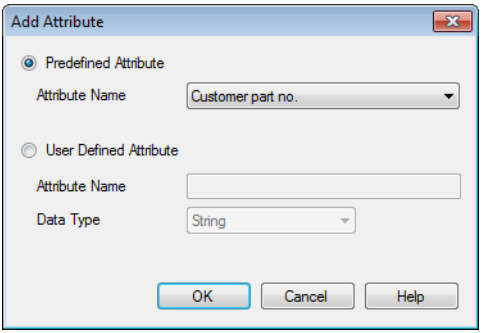

Figure 6/4: Add Attribute dialog window

Two types of attributes can be added.

Predefined Attribute

Attributes predefined in FluidDraw can be selected from a drop-down list. These include *Product name*, *Remark* and *Description*.

User Defined Attribute

If this option is selected you can specify an attribute name and type for the new attribute.

You can list and remove the attributes in the *Products* and *Supplier* tables using the Attribute Properties... button. The attributes "*Supplier*", "*Part number*" and "*Symbol Name*" cannot be deleted.

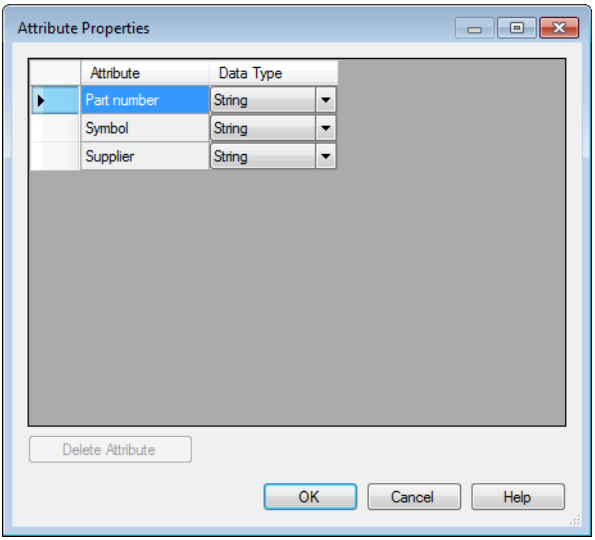

Figure 6/5: Attribute Properties dialog window

The selected attribute can be removed using the Delete Attribute button.

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Manage Translation Tables

Chapter 7

Translation tables can be managed using FluidDraw. Each row in the table contains texts in different languages. Each column contains one language. The Text ID column is a special column. The text ID serves as a placeholder for a text and can be used in different places in FluidDraw. Depending on the set language, the text in the corresponding language may be displayed instead of the text ID.

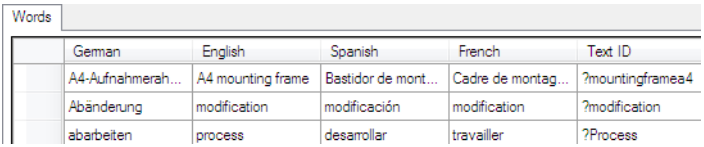

Figure 7/1: Example of a translation table

The text ID can be arbitrarily chosen. In the example above the English term with a preceding question mark was used.

It is also possible to use a language as the text ID. This must be specified during the import operation, which is described further below. We do not recommend this approach since the text ID may not always be unique. In the above example, the English word “modification” occurs twice, for example, but is translated differently depending on the context.

The translation tables are stored in a FluidDraw-specific file format. The translation table and language to be used are specified in a project or circuit on the *Language* tab in the properties dialog window. You can find further information under Language.

Text IDs can be used in user-defined attributes for both the attribute name and the attribute value. The text is displayed against a yellow background in the set language in the corresponding dialog windows. As soon as you want to edit an attribute name or attribute value the text ID is displayed again in the corresponding field.

Figure 7/2: Text IDs in user-defined attributes

FluidDraw provides a search dialog for finding a text ID for a specific text in the selected translation table. When you are editing a text field the following dialog can be opened using the Translation Table... button.

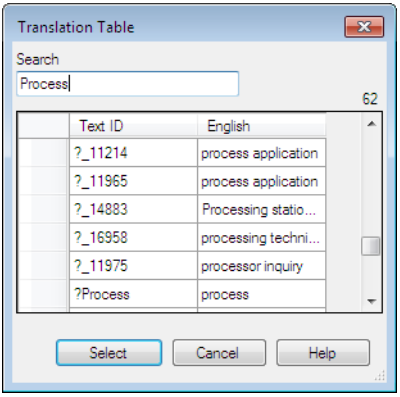

Figure 7/3: *Translation Table* dialog window

Search

Enter a language text here to find the associated text ID. You do not need to enter the text in full; you can select the desired row directly.

The selected text ID is displayed in the text field after you confirm the selection.

If the user-defined attributes are used in parts lists then these are displayed in the parts lists in the corresponding language. Note that the predefined attributes are independent of the chosen language in the translation table. The language of the predefined attributes is defined by the language set for the Festo product catalogue.

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Text IDs can also be used in text components.

The dialog window for managing the translation tables is opened using the Tools | Translation Tables... menu item.

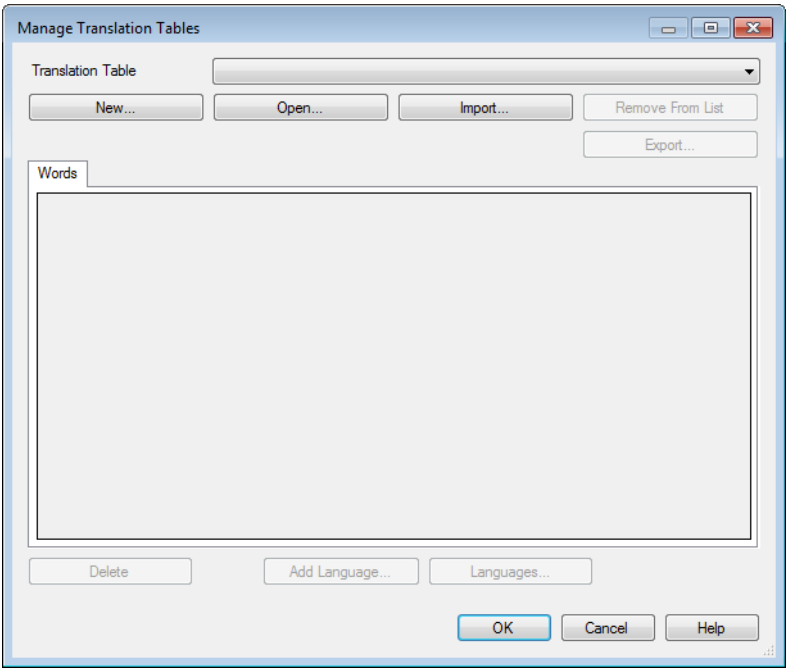

Figure 7/4: *Manage Translation Tables* dialog window

Translation Table	Using this drop-down list you can select the translation table that you want to manage.
New...	Using this button you can create a new translation table. You will then be asked for a file name under which the translation table should be saved.
Open...	Opens a file selection dialog window that you can use to open an existing FluidDraw translation table.

Import...	Opens a file selection dialog window that you can use to open an external translation table. The translation table must be in CSV (Comma-Separated Values) format, which most database programs can generate. Further settings for the import are described further below.
Remove From List	Removes the selected translation table from the drop-down list. The associated file is not changed.
Words	This tab displays the translation table.
Export...	Exports the translation table as a CSV file.
Delete	Deletes the highlighted language entry from the translation table.
Add Language...	Adds a further language to the translation table.
Languages...	Opens a dialog window that lists all of the languages and can be used to remove a language.
	If a file was selected for importing an external translation table then various settings can be made using the following dialog window. FluidDraw analyses the CSV file to be imported and suggests useful presettings.

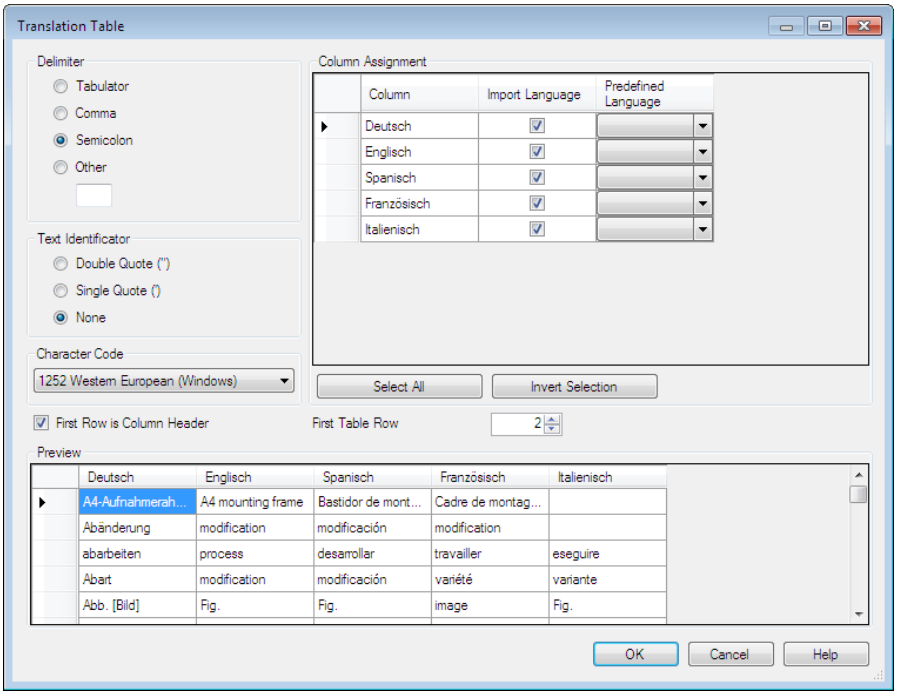

Figure 7/5: *Translation Table* dialog window

Delimiter	Defines the delimiter that can be used to differentiate the languages.
Text Identificator	Defines whether and how quotes have been added to texts.
Character Code	Defines the character set to be used.
Column Assignment	Defines the languages to be imported from the database and the languages predefined in FluidDraw that they should be assigned to. You can select all of the languages using the Select All button and invert the selection using the Invert Selection button.

First Row is Column Header — Defines that the first row contains the language names.

First Table Row — Defines the row from which the data records are to be imported.

Preview — Displays a preview of the data records that are being imported.

The following dialog window opens if the Export... button was selected to export the translation table as a CSV file.

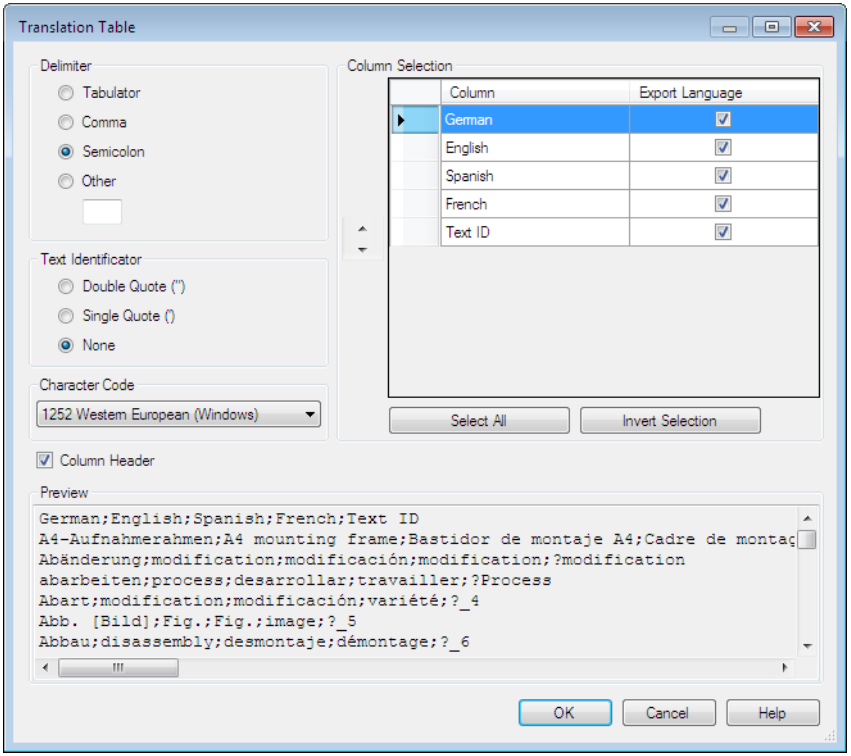

Figure 7/6: *Translation Table* dialog window

Delimiter — Defines the delimiter that can be used to differentiate the languages.

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Text Identificator	Defines whether and how quotes are to be added to texts.
Character Code	Defines the character set to be used.
Column Selection	Defines the languages to be exported. You can select all of the languages using the Select All button and invert the selection using the Invert Selection button.
Column Header	Defines whether an additional first row containing the language names as column headers should be exported.
Preview	Displays a preview of the data records that are being exported.

Further languages can be added using the Add Language... button.

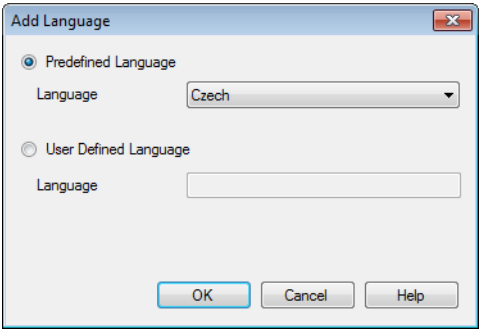

Figure 7/7: Add Language dialog window

Two types of languages can be added.

Predefined Language	Languages predefined in FluidDraw can be selected from a drop-down list.
User Defined Language	You can enter any language if this option is selected.

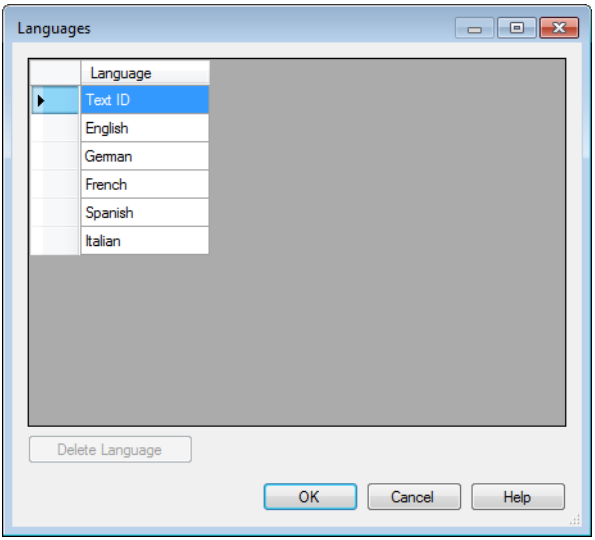

Figure 7/8: Languages dialog window

The languages in the selected translation table can be listed and removed using the Languages button. The "*Text ID*" column cannot be deleted.

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Dimension

Chapter 8

FluidDraw allows both automatic and manual dimensioning.

8.1 Draw dimension

The buttons

Horizontal

Vertical

Align

Angular

Flag

activate the corresponding mode for drawing the dimension arrows. Alternatively you can also access the dimensioning functions in the Draw menu under Dimension.

Horizontal, vertical and diagonal dimensioning is done by defining two points for the distance as well as then clicking to position the dimension text. Angular dimensioning requires the center point to be defined as well as two points for the angle. The fourth click in turn defines the position of the dimension text. The Flag dimension function can also be used for general labeling of important points in the circuit. Two points for a line with any pitch and a final click for the text are needed for this.

8.2 Settings for the dimension

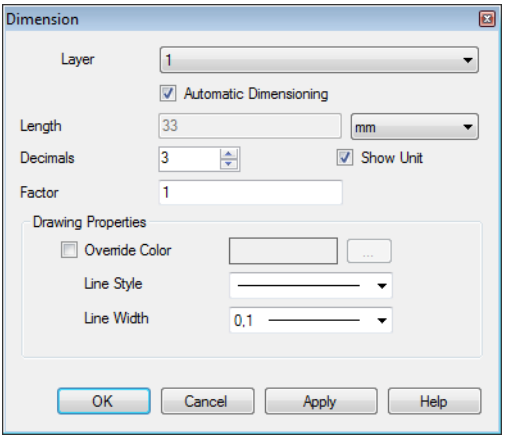

Figure 8/1: *Dimension* dialog window

Layer	Defines the drawing layer for the dimension.
Automatic Dimensioning	Activates or deactivates automatic adaptation of the dimension when the dimension length is changed.
Length	If the *Automatic Dimensioning* option is deactivated you can enter any number that will be displayed as the length dimension. A unit can also be selected. *Show Unit* defines whether the unit should be displayed.
Decimals	Defines the number of decimal places.
Factor	Determines the factor by which the real length is multiplied for the displayed value. This is necessary if you are creating a drawing with a scale other than 1:1.
Color	Defines the color for the dimension.

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Line Style	Defines the line style for the dimension.
Line Width	Defines the line width for the dimension.

Dimensions, like all other objects in FluidDraw, can be moved, rotated, mirrored and scaled. The display value of the dimension is automatically adapted during scaling if the *Automatic Dimensioning* option is activated.

Equipment identifications and designation conventions

Chapter 9

FluidDraw supports the structured and hierarchical assignment of equipment identifications, i.e. a complete equipment identification can be made up of several component identifications.

The following attributes can be used for structuring and are put together according to predefined conventions to form a complete equipment identification:

— *Installation*

— *Location*

— *Circuit*

— *Component*

— *Connector*

The attributes *Installation*, *Location* and *Circuit* can be specified for a symbol, circuit and project. You can specify whether the attributes should be copied over from a parent element (node). For example, you can copy over the installation information from the circuit diagram so that it does not have to be individually entered for each symbol.

Designation conventions describe how the individual attributes *Installation*, *Location*, *Circuit*, *Component* and *Connector* are put together to form a full identification. They specify the order in which the individual attributes are put together to form a full identification and the separators (prefix or postfix) used between them.

The following example is intended to serve as an explanation. The list below constitutes a set of designation conventions. Each attribute can have a preceding (prefix) or succeeding (postfix) separator. The separators to be used are placed in inverted commas. The specified set of designation conventions corresponds to the default setting in FluidDraw for electrical engineering.

— "=" *Installation*

— "+" *Location*

— "-" *Component*

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The value of the *Component* attribute is “B1” and is stored in the symbol to be identified. *Installation* gets the value “G1” and *Location* the value “X1”, both of which are stored in the circuit. A note is included with the symbol that these attributes should be copied over from the circuit. The full equipment identification is then as follows:

— =G1+X1-B1

If it is clear from the context that *Installation* and *Location* are stored in the circuit then this information can be hidden when displaying the equipment identification in the circuit to make things clearer. The *Suppress Inherited Parts* option must be selected in the associated symbol for this. The identification that is displayed is then:

— -B1

FluidDraw also supports the hierarchical structuring of identifications. Using a hierarchy makes sense if a symbol is a subobject of another object, for example the plug in a plug strip or the solenoid coil in a solenoid valve. The full identification is put together according to the defined designation conventions. The *Component* attribute is also added in accordance with the defined object hierarchy. You start at the top hierarchy level when designating an object.

The hierarchy is defined by establishing a reference between a symbol (object) and the parent object. To illustrate this we will expand upon the example described above. The symbol with the *Component* attribute with the value “B1” was not previously hierarchically structured. This is changed by assigning an “A1” for a parent symbol to the symbol. The full identification for “B1” is then as follows:

— =G1+X1-A1-B1

The identification that is displayed remains unchanged.

FluidDraw supports different sets of designation conventions. For each symbol you can select which set of conventions should be used for its identification. The set of conventions to be used for the supplied symbols is preset. The preset sets of conventions can be customized in the *Designation Conventions* tab under Tools -

Options... . These sets of conventions are copied when a project or circuit diagram is created from new. Copying the sets of conventions into the circuit diagram or project guarantees that the designation conventions are not dependent on the FluidDraw presettings if the circuit diagram or project is passed on to someone else. Changes to the conventions must be made in the circuit diagram or project.

The identification type *Free Input* can be chosen if no designation conventions are to be used. In this case the identification is an unstructured character string that is not made up of the attributes described above.

The sets of conventions preset in FluidDraw are as follows:

Fluidics

Fluid engineering symbols are designated in accordance with ISO 1219-2. The identification is put together as follows: *Installation* - *Circuit Component* : *Connector* This set of conventions can be customized if necessary.

Electrics

Electrical engineering symbols are designated in accordance with EN 81346-1 (successor to EN 61346-1). The identification is put together as follows:

= *Installation* + *Location* - *Component* : *Connector* This set of conventions can be customized if necessary.

User Defined

This set of conventions allows you to freely define the identification. The attributes *Installation*, *Location*, *Circuit*, *Component* and *Connector* can be selected in any order for this. You can also specify separators that are to be inserted before (prefix) and after (postfix) the individual attributes.

9.1 Renumber Designations

Designations (identifications) are automatically assigned when symbols are created. FluidDraw supports the reassignment of identifications within a circuit diagram. You can define which sym-

bols are to get new identifications and the order in which they are to be renumbered.

Renumbering is started via the Page | Renumber Designations... menu. The following dialog window opens.

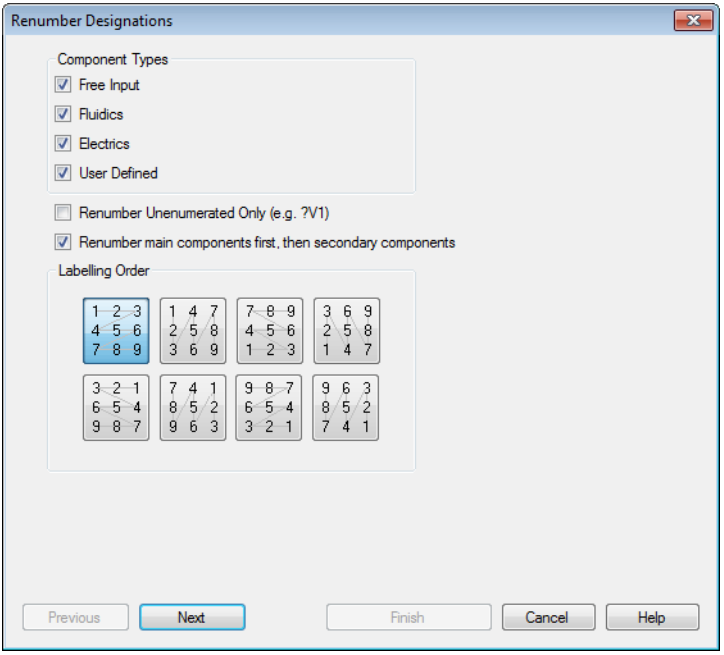
Renumber Designations
Component Types
Free Input
Fluidics
Electrics
User Defined
Renumber Unenumerated Only (e.g. ?V1)
Renumber main components first, then secondary components
Labelling Order
1 2 3 4 5 6 7 8 9
1 4 7 2 5 8 3 6 9
7 8 9 4 5 6 1 2 3
3 6 9 2 5 8 1 4 7
3 2 1 6 5 4 9 8 7
7 4 1 8 5 2 9 6 3
9 8 7 6 5 4 3 2 1
9 6 3 8 5 2 7 4 1
Previous
Next
Finish
Cancel
Help

Figure 9/1: *Renumber Designations* dialog window

Component Types

For each symbol you can specify the designation convention to be used. You can specify the designation conventions to be taken into consideration during renumbering under *Component Types*. Only those symbols with the appropriate convention will be given a new identification.

Renumber Unenumerated Only (e.g. ?V1)

Only symbols that have not yet been given an identification will be taken into consideration.

If the *Enumerate Automatically* option is selected in the Designation Conventions tab in the program options then FluidDraw will automatically assign identifications for newly created symbols. If this option is not active identifications beginning with a question mark will be assigned. As per the convention, FluidDraw will not regard these symbols as having an identification.

Renumber main components first, then secondary components

If this option is activated the renumbering will be done in two passes. The main components are renumbered in the first pass and the secondary components in the second pass. An example of a main component is the coil of a relay, while its contacts are secondary components.

Labeling Order

The labeling order can be defined using the various buttons.

The renumbering is started after you click the Next button.

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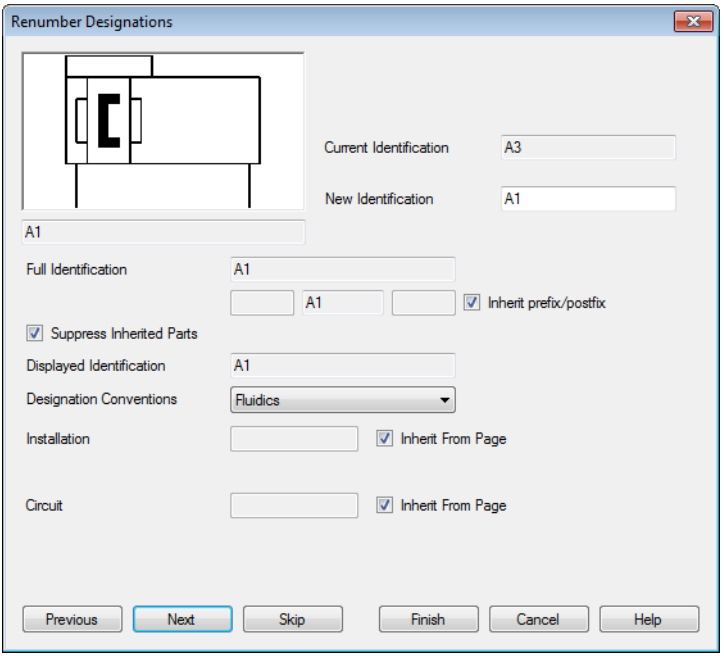

Figure 9/2: *Renumber Designations* dialog window

Current Identification	Shows the current full identification.
New Identification	Contains the suggested new identification for the component. You can change this suggestion. The new full identification is displayed in the *Full Identification* field.
Full Identification	Shows the new full identification.
Displayed Identification	Shows the new identification as it is displayed in the circuit. If the *Suppress Inherited Parts* option is selected then parts of the identification such as "*Installation*", "*Circuit*" or "*Location*" will be hidden if they have been stored in the circuit diagram or project.
Designation Conventions	The designation conventions for the component to be identified can be selected here.

Inherit From Page

If this option is not active the following identification components can be defined for the symbol: "*Installation*", "*Location*" and "*Circuit*". Only components that are used in the set designation convention are available.

The Next button copies over the new identification and the Skip button leaves the old identification unchanged. FluidDraw then continues with the next symbol.

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Component attributes

Chapter 10

The FluidDraw circuit symbols largely correspond to the components in the Festo product catalogue. Even if you have not installed the product catalogue FluidDraw can read most of the component attributes from the database supplied with the program. If you have installed a newer version of the product catalogue then FluidDraw automatically accesses the current data. Open the *Properties* dialog window for the component by double-clicking a symbol or using the Edit menu and the Properties... menu item.

10.1 Component attributes in the *Properties* dialog window

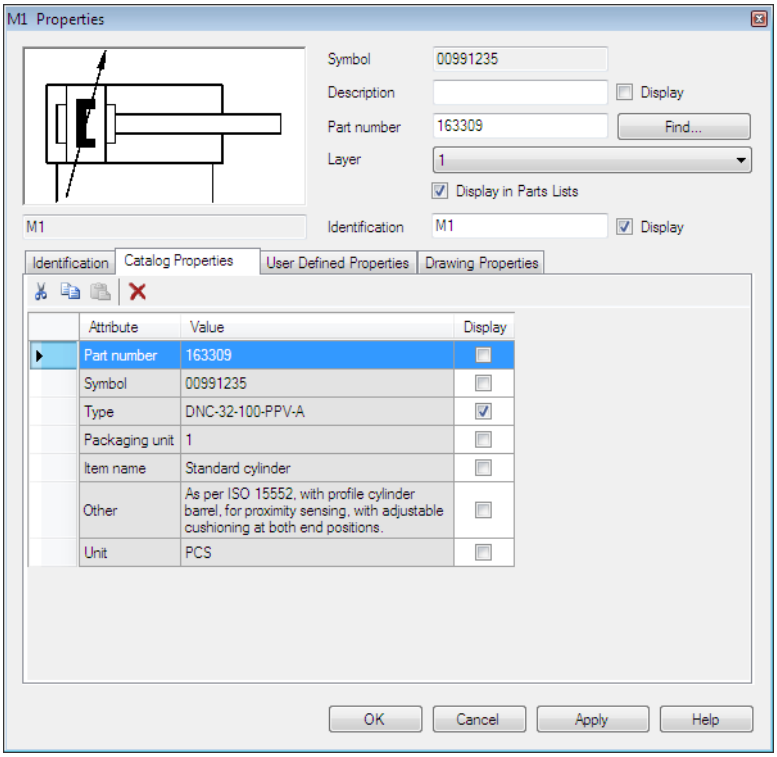

Figure 10/1: *Properties* dialog window for a component:

The properties of a component are saved in attribute value pairs. The attributes are divided into different groups. The first group contains the general properties:

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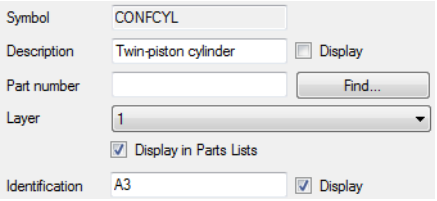

Figure 10/2: Detail from the *Properties* dialog window for a component: General properties

Symbol Name

Displays the name of the circuit symbol. The symbol name is mapped to appropriate products in the Festo product catalogue. Users cannot edit the symbol name.

Description

Contains a more detailed description or the complete name of the circuit symbol where applicable. Users can edit this. The identification is shown as text in the circuit drawing if the "*Display*" option is selected.

Part number

The part number uniquely identifies a product. You can enter the part number manually or search via the Find... button in the product catalogue. The component attributes saved in the catalogue are only automatically taken over if the selection is made via the product catalogue. You can find these attributes in the *Catalog Properties* tab of the *Properties* dialog window for the component.

Layer

In this selection list you define the drawing layer for the symbol. Depending on the setting for the drawing layer it may not be possible to display or edit the symbol. In order to make the symbol visible or change the settings you have to temporarily activate the drawing layer on the Drawing Layers... menu item from the View menu.

Identification

Here you can assign an identification that uniquely identifies the component in the circuit diagram. The identification is shown as text in the circuit drawing if the "*Display*" option is selected.

Note: FluidDraw automatically assigns a unique identification when inserting or copying circuit symbols. An automatically assigned identification text begins with a question mark and can be edited by the user (FluidDraw shows a warning if you are assigning an identi-

	fication that already exists). You can make more detailed settings for the equipment identification in theIdentification tab.
Display in Parts Lists	Deactivate this option if you do not want the symbol to appear in the parts list.

10.2 Identification

In the "*Identification*" tab you can enter properties that influence how the identification for the symbol is displayed in the circuit diagram. You can find further information under Equipment identifications and designation conventions.

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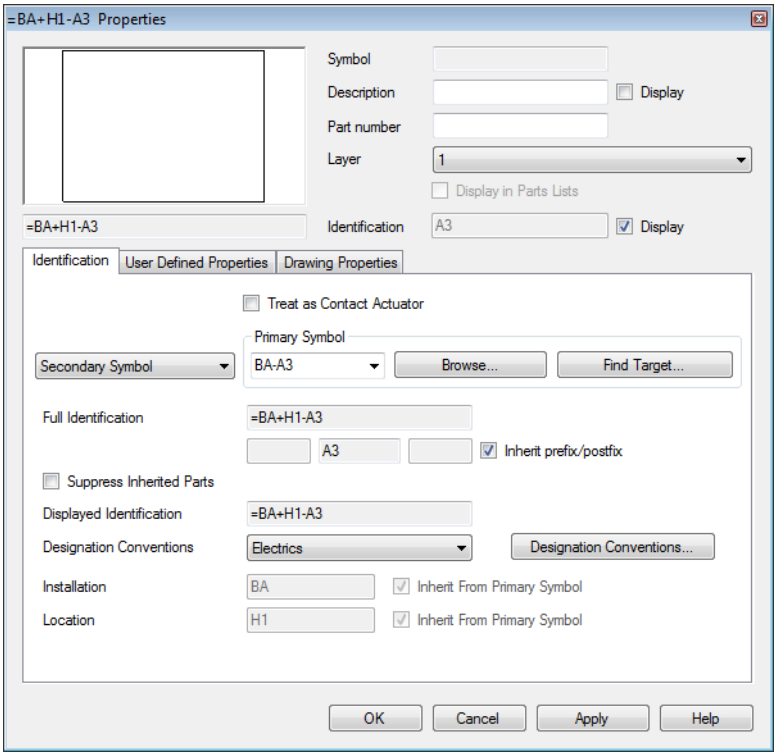

Figure 10/3: Detail from the *Properties* dialog window for a component: *Identification* tab

Treat as Contact Actuator

If this option is activated then contacts can be linked with this symbol and the symbol is assigned a contact image. This allows the number of symbols that can actuate contacts to be extended as a user-defined setting. For example it allows custom relay magnets to be defined.

Parent Object

If this option is activated then a parent object can be specified whose identification is used to make up the full identification. Parent objects can be selected via the list box or their full identifica-

	tion entered directly. The "Browse..." button opens a dialog window that shows all objects in the project as a tree.
Full Identification	This field shows the full equipment identification.
Inherit prefix/postfix	If this option is deactivated then the separators that are placed before (prefix) or after (postfix) the identification can be specified. The separators specified in the designation conventions are ignored in this case. In combination with parent objects this enables aspect changes as described in EN 81346-1.
Displayed Identification	This field shows the equipment identification displayed in the circuit diagram. If the *Suppress Inherited Parts* option is selected then parts of the identification such as "*Installation*", "*Location*" or "*Circuit*" will be hidden if they have been stored in the circuit diagram or project. The parts of the parent object's identification will also be hidden if a parent object was specified.
Designation Conventions	Here you define the designation convention to be used for the identification. The following are available: *Fluidics*, *Electrics*, *User Defined* and *Free Input*. The properties dialog window for the circuit where the designation conventions can be displayed and customized is opened using the Designation Conventions... button.
Installation	The *Installation* property that can be used as part of the identification is defined in this field. If the *Inherit From Parent Object* option is selected then the property will be copied over from the circuit, project or specified parent object. This field will only be visible if *Installation* is used in the set designation convention.
Location	The *Location* property that can be used as part of the identification is defined in this field. If the *Inherit From Parent Object* option is selected then the property will be copied over from the circuit, project or specified parent object. This field will only be visible if *Location* is used in the set designation convention.
Circuit	The *Circuit* property that can be used as part of the identification is defined in this field. If the *Inherit From Parent Object* option is selected then the property will be copied over from the circuit, project or specified parent object. This field will only be visible if *Circuit* is used in the set designation convention.

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10.3 Catalog Properties

Component attributes from the product catalogue as well as attributes specified by the user are displayed in tabular form in different tabs. The table entries from the catalogue cannot be edited. The value of an attribute is listed in the "*Value*" column. This value can be displayed as text in the circuit diagram next to the symbol if the "*Display*" option is activated.

The component attributes copied over from the product catalogue are displayed in the "*Catalog Properties*" tab.

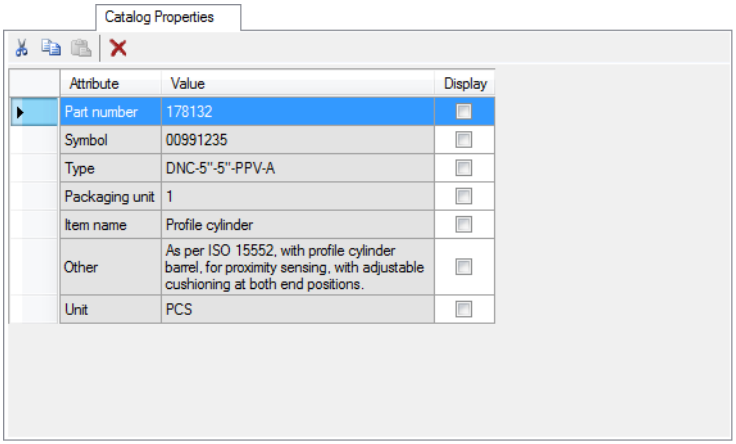

Figure 10/4: Detail from the *Properties* dialog window for a component: *Catalog Properties* tab

10.4 User Defined Properties

You can enter your own component attributes in the "*User Defined Properties*" tab.

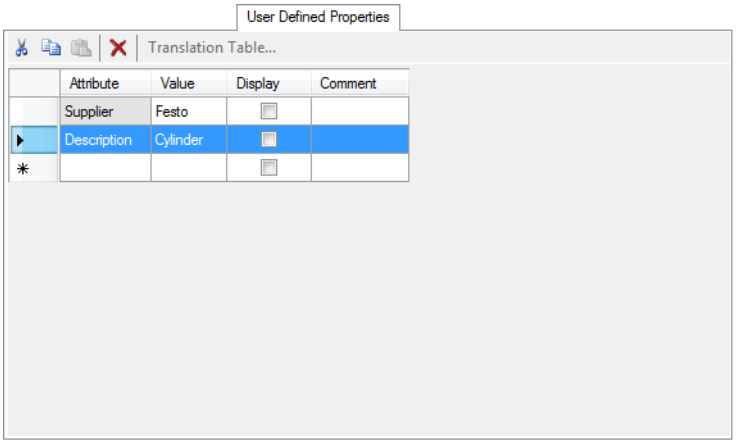

Figure 10/5: Detail from the *Properties* dialog window for a component: *User Defined Properties* tab

Translation Table...

If you are editing a text field you can use this button to open a search dialog via which you can find the text ID for a language text from the translation table.

In order to edit an entry the corresponding row must be selected by clicking on it. Clicking on the table cell to be modified again then enables you to edit the entry in the cell.

A row can be deleted by first clicking the row to highlight it. The highlighted row can then be deleted using the Del key.

You can add any desired attributes by filling out the empty cells on the last row.

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10.5 Drawing Properties

You can enter a number of drawing properties that influence how the symbols are displayed in the circuit diagram in the "*Drawing Properties*" tab.

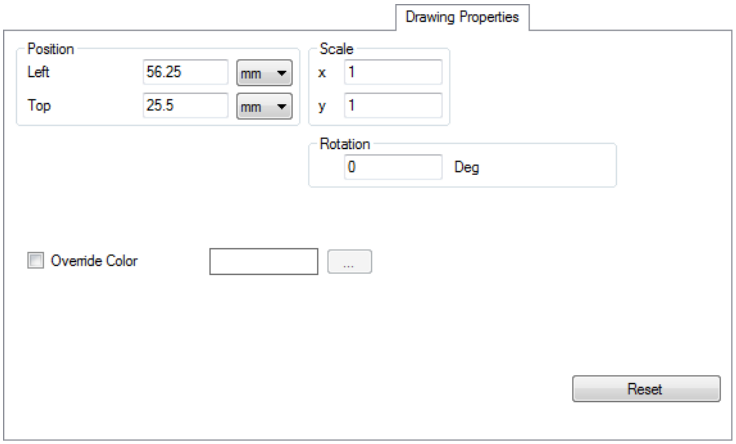

Figure 10/6: Detail from the *Properties* dialog window for a component: *Drawing Properties* tab

Scale	Defines the scaling in the x or y direction. The scaling factor can also be defined with the help of the mouse pointer. This is described in the "Scale symbols" section.
Rotation	Defines the angle of rotation in degrees. The angle of rotation can also be defined with the help of the mouse pointer. This is described in the "Rotate symbols" section.
Override Color	If this option is activated then another color can be selected for the symbol.
Reset	Resets the geometrical settings to the default values: Scaling to 1, rotation to 0 and "*Override Color*" deactivated.

10.6 Main and secondary components

As described under Component attributes in the *Properties* dialog window, the FluidDraw circuit symbols largely correspond to the components in theFesto product catalogue. These symbols are called main components. However there are also secondary components, which do not correspond to components in the Festo product catalogue. These secondary components are usually symbolic representations of a partial aspect of an associated main component.

All product properties are stored in the main component. The secondary components only have a description and a reference to the associated main component. In electrical engineering in particular, components such as relays are divided into main and secondary components where the coil is the main component and the contacts are the secondary components.

10.7 Linking main and secondary components

Main and secondary components are linked using the symbol for the secondary component. The circuit diagram detail shows a relay comprising a coil as the main component and two contacts as the secondary components. The contacts are to be linked with the coil. This information is evaluated when displaying the contact image.

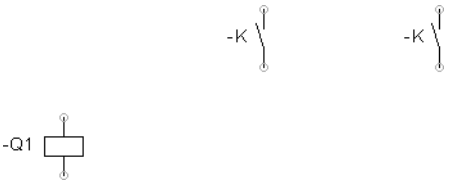

Figure 10/7: Relay comprising coil with two contacts

The symbol identifications are the defaults used in FluidDraw. The symbols are not linked together yet.

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⇢ Open the corresponding properties dialog window by double-clicking a contact.

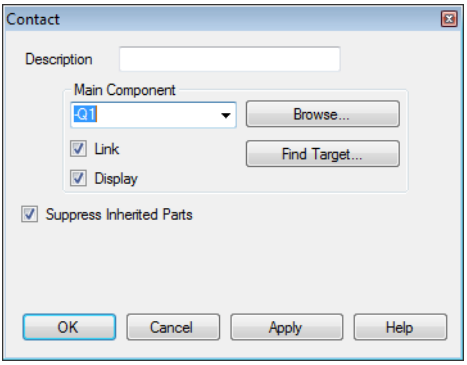

Figure 10/8: Properties dialog window for a contact

Description	Defines a description for the secondary component. In the case of a contact, this is shown in the terminal diagram.
Main Component	A compatible main component can be selected from a list. The main component identification can also be entered directly as text.
Browse...	Opens a dialog that shows all compatible main components as a tree in accordance with the object hierarchy.
Link	If this box is checked then the secondary component is logically linked with the main component. If the main component is then renamed, the link is retained and the identification of the linked secondary component is adapted as appropriate to the main component identification.
Find Target...	If the secondary component is logically linked with a main component, a search can be performed for the associated main component using this button.
Display	If this box is checked then the main component's identification is shown as the identification for the secondary component.

Suppress Inherited Parts

If there are designation conventions assigned for the main component, parent parts of the identification that are defined in the circuit diagram or project will be hidden.

⇢ Select “Q1” from the list of compatible main components. Proceed in the same way for the second contact.

Selecting from the list of compatible main components automatically establishes the logical links between the contacts and the coil. The circuit diagram should now look as follows:

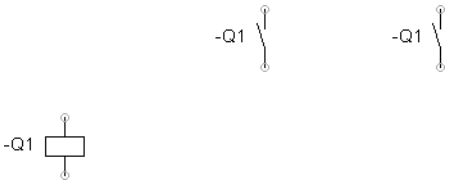

Figure 10/9: Relay comprising coil with two contacts

If you now change the coil identification to “Q2”, the logical links mean that the identifications at the contacts will also be automatically changed to “Q2”.

Examples of this are relays with the coil as the main component and the contacts as secondary components as well as electromagnetic directional control valves with the pneumatic symbol as the main component and the valve solenoids as secondary components in the electrical part of the circuit diagram.

10.8 Link solenoid valves and solenoid coils

The coils belonging to solenoid valves are usually displayed separately in the electrical part of a circuit diagram. The link between a solenoid valve and the associated coils is defined at the solenoid valve symbol.

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The following circuit diagram shows a solenoid valve and the symbols for two separate solenoid coils. No link has been established yet between the solenoid valve and the coils.

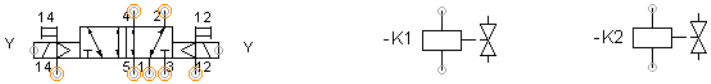

Figure 10/10: Solenoid valve and two separate coils

There are two ways of establishing a link between a solenoid valve and a coil. The first is using the properties dialog window for the solenoid valve.

⇢ Open the appropriate properties dialog window by double-clicking the solenoid valve and select the *Connector Labels* tab.

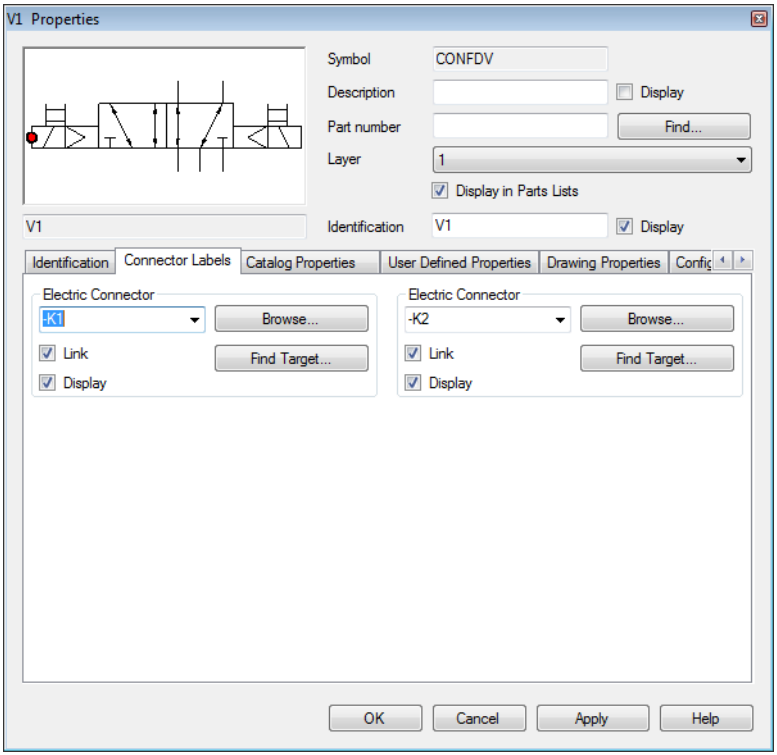

Figure 10/11: *Properties* dialog window, *Connector Labels* tab

This tab shows all of the solenoid valve's connectors. Connectors refer, among other things, to the logical connection options for the solenoid coils. The input fields of the left-hand electric connector are described below. The descriptions apply analogously to the right-hand connector and other types of logical connectors.

Electric Connector (Left)

The identification for the left-hand solenoid coil can be entered in this list box or selected from a list. When you click in this field the corresponding connector is highlighted in the preview. This helps to locate the connector, particularly when dealing with turned or mirrored symbols.

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Browse... Opens a dialog that shows all compatible solenoid coils as a tree in accordance with the object hierarchy.

Link If this box is checked then the solenoid coil is logically linked with the connector at the solenoid valve. If the solenoid coil is renamed the link is retained and the identifications of the coils at the solenoid valve are changed to match the coil identifications.

Find Target... If the connector at the solenoid valve is logically linked with a coil a search can be performed for the associated coil using this button.

Display If this box is checked the coil's identification is shown as the identification for the solenoid valve connector.

⇢ Select "-K1" from the list of compatible solenoid coils.

Figure 10/12: Left connector linked with coil "-K1"

The second way of linking a solenoid valve with a coil is to double-click the solenoid valve's connector directly. The coil connectors are represented like pneumatic connectors within the solenoid valve by means of small circles.

⇢ Double-click the right connector of the solenoid valve.

A dialog window whose fields correspond to the entries for a connector in the *Connector Labels* tab of the *Properties* dialog window.

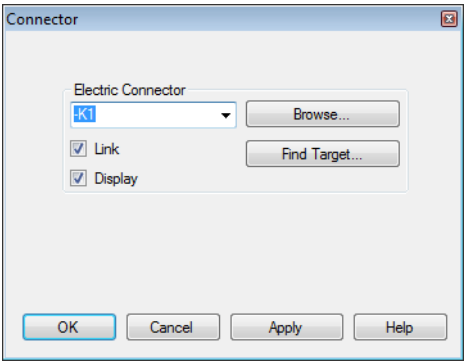

Figure 10/13: *Connector* dialog window

⇢ Select “-K2” from the list of compatible solenoid coils.

The (electric) connectors of the solenoid valve are now linked with the solenoid coils.

Figure 10/14: Link solenoid valve and solenoid coils

The above-mentioned ways of linking a solenoid valve and coils should only be used if each symbol has been individually inserted into the circuit diagram. For projects, FluidDraw manages the associated coil symbols for each solenoid valve internally. When a solenoid valve is inserted into a circuit diagram, the associated solenoid coils are simultaneously placed in a special library. This concept is described underUnplaced objects.

10.9 Attributes of the text components

In FluidDraw text components serve, firstly, to insert comments and labels and, secondly, can be defined by the labels and accessories

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without displaying a symbol. Open the dialog window *Properties* of the text component by double-clicking on a text or via the Properties... menu item on the Edit menu.

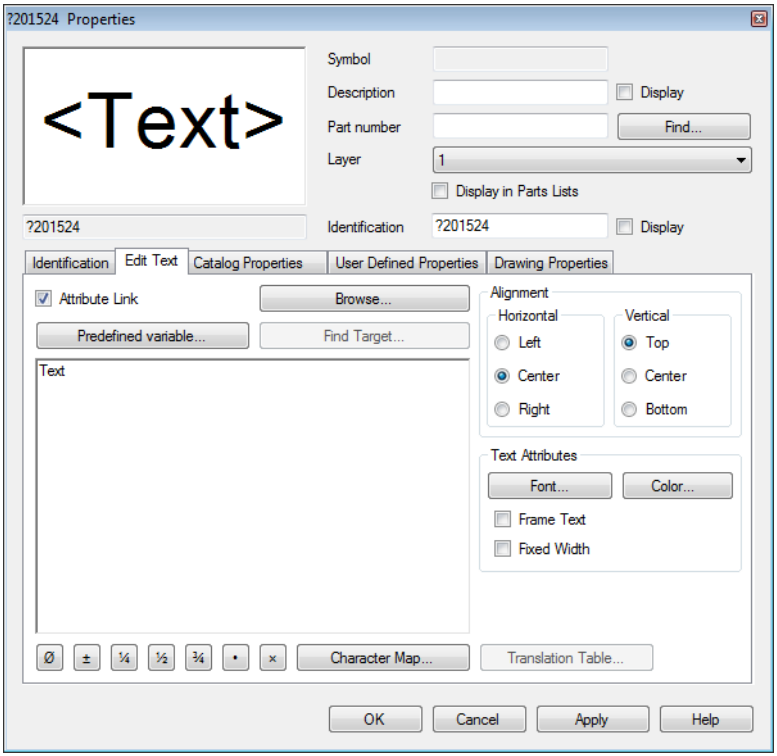

Figure 10/15: *Properties* dialog window for a text component:

A text component possess all of the attributes of a standard component. The text properties are located on the "*Edit Text*" tab.

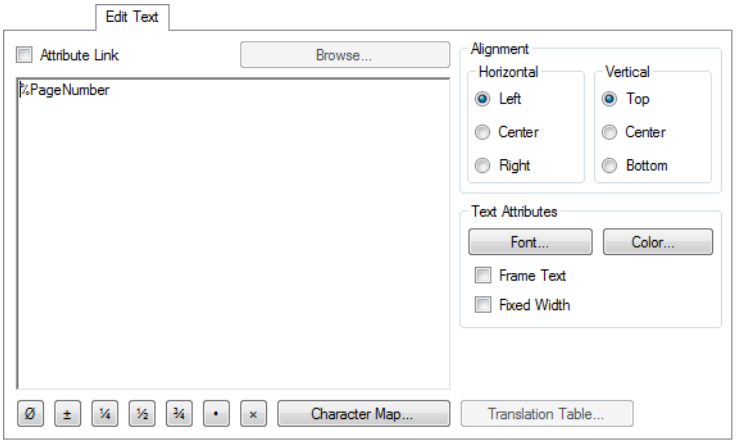

Figure 10/16: Detail from the *Properties* dialog window for a text component: *Edit Text* tab

Edit Text

Enter your text into the input field on the left-hand side. You can also enter text with multiple lines. Press the Enter key to create a line break.

Alignment

Defines the horizontal or the vertical alignment of the text within the text field.

Font...

Defines the text font.

Color...

Defines the text color.

Frame Text

Draws a frame around the text field.

Attribute Link

If this option is activated a text that identifies a link to an attribute is displayed instead of the text entered. The value of the selected attribute is displayed in the circuit diagram. You can find a detailed description of this function under Link text components with attributes. A predefined placeholder such as the page number can also be selected using the Predefined variable... button.

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Translation Table... If you are editing a text field you can use this button to open a search dialog via which you can find the text ID for a language text from the translation table.

10.10 Link text components with attributes

Text components can also display attributes of other components, values of predefined placeholders, attributes of a circuit or the project. The text component must be linked to the corresponding attribute for this. The linked attribute is defined in the input field of the "*Edit Text*" tab in the *Properties* dialog window for the text component. The activated *Attribute Link* option defines that the text in the text field should not be displayed but rather interpreted as a link.

Example:

Assuming that your project is called "Project1" and possesses the "Supplier" attribute with the value "Festo". You project contains the "Circuit1" circuit and you would like to display the value of the "Supplier" attribute, in this example namely the value "Festo", in this circuit diagram.

⇢ Insert a text component into the circuit drawing by selecting the text element on the drawing elements toolbar and then left-clicking the circuit drawing. The *Properties* dialog window for the text component then opens.

Note: You can open the dialog window of an existing text component by double-clicking it or using the Edit menu and the Properties... menu item.

⇢ Activate the *Attribute Link* option and then click the Browse... button.

A window opens displaying the hierarchy of all of the available attributes. Please note that only those objects are listed that have an identification assigned by the user. Identifications beginning

with a question mark “?” are not listed. These are identifications that have been automatically assigned by FluidDraw. The desired attribute is located under “*Attribute Tree*” - “Project1” - “Supplier”.

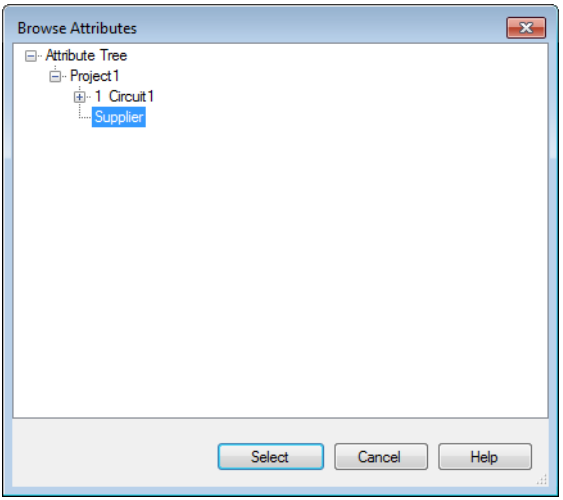

Figure 10/17: *Browse Attributes* dialog window

⇢ Select “Supplier” and then click the Select button.

The “Project1.Supplier” value is displayed in the input field and “Festo” in the preview. The complete and unique name of the attribute contains all of the hierarchy levels beginning at the project. The individual layers in the name are separated by a full stop. It is also possible to enter only the attribute name into the input field. In this example: “Supplier”. The hierarchy is then searched from the bottom up for the attribute, beginning with the text components. If the attribute searched for is not found in that component then the circuit and then the project are searched for the attribute.

If the attribute is not found then the attribute name is displayed in the circuit diagram in angle brackets. The missing attribute can be created at a later point in time. The link is then created automatically.

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The concept of linking text components with attributes is also utilized for labeling drawing frames.

10.11 Text components with specified links

Text components are automatically generated for displayable component attributes and connector labels which are linked to the corresponding attributes. Open the *Display Attribute* dialog window with which you can adjust how the text is displayed by double-clicking on the text component or via the Properties... menu item on the Edit menu.

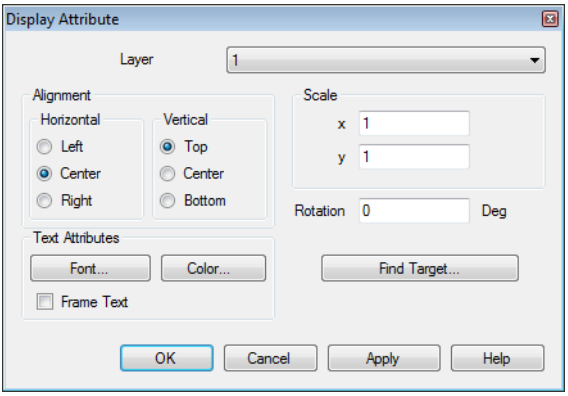

Figure 10/18: *Display Attribute* dialog window

Alignment

Defines the horizontal or the vertical alignment of the text within the text field.

Scale

Defines the scaling factor of the text in the x or y direction.

Note: You can also change the text size by selecting another font size in the font type dialog window. You open this dialog window using the Font... button under *Text Attributes*.

Rotation	Defines text's angle of rotation in degrees.
Font...	Defines the text font.
Color...	Defines the text color.
Frame Text	Draws a frame around the text field.
Find Target...	The target of a linked text is the attribute which the text refers to. This button opens the *Properties* dialog window of the object which contains this attribute.

10.12 Change the properties of multiple objects simultaneously

If multiple objects are selected, choosing the Properties... menu item on the Edit menu opens a dialog window with a limited selection of properties. It only contains those properties which meaningfully relate to all of the selected objects. This enables you to change the font for multiple texts in a single operation, for example. The more different object types (symbols, connectors, drawing elements, texts, etc.) that are selected, the less common properties are available.

The following tabs are available for the common properties depending on the objects highlighted.

10.12.1 Drawing Properties

The dialog elements available within a tab depend on the objects highlighted.

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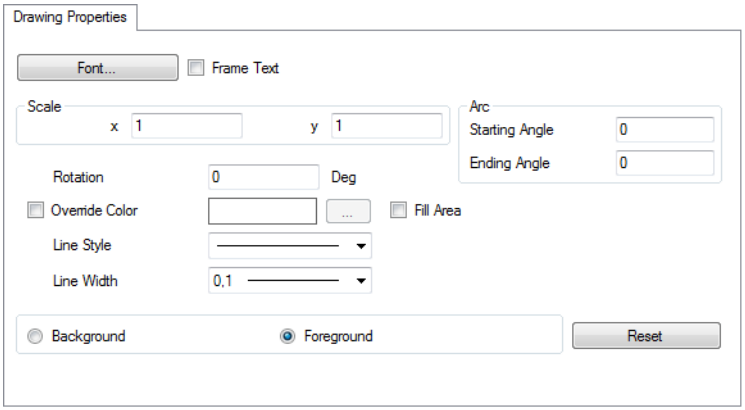

Figure 10/19: *Properties* dialog window, *Drawing Properties* tab: several highlighted objects

Font...	Defines the font type of the text.
Frame Text	Draws a frame around the text field.
Scale	Defines the scaling factor of the text in the x or y direction.
Rotation	Defines the angle of rotation of the text field in degrees.
Override Color	Defines the color of the drawing element.
Line Style	Defines the line style.
Line Width	Defines the line width.
Start Cap	Defines how the beginning of the line is displayed.
End Cap	Defines how the end of the line is displayed.
Background	Sets the location of the drawing element to the background. This means that all of the circuit symbols are on top of this. In particular this means that symbols are not covered by filled drawing elements, for example.

Foreground	Sets the location of the drawing element to the foreground. This means that all of the circuit symbols are underneath this. In particular it means that symbols are covered by filled drawing elements, for example.
Reset	Reset the settings to the default values.

10.12.2 Main Component

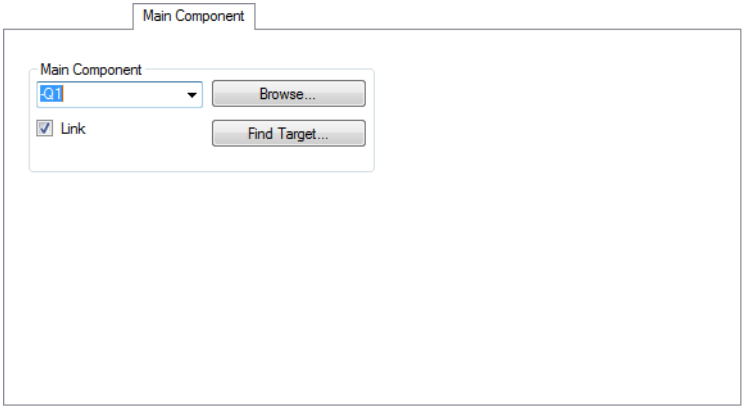

Figure 10/20: *Properties* dialog window, *Drawing Properties* tab: several highlighted objects

Main Component	A compatible main component can be selected from a list. The main component identification can also be entered directly as text.
Browse...	Opens a dialog that shows all compatible main components as a tree in accordance with the object hierarchy.
Link	If this box is checked then the secondary component is logically linked with the main component. If the main component is then renamed, the link is retained and the identification of the linked secondary component is adapted as appropriate to the main component identification.

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Find Target...	If the secondary component is logically linked with a main component, a search can be performed for the associated main component using this button.

Chapter 11

Various analyses can be inserted into a circuit diagram using the Insert menu item. Alternatively you can also use the button on the toolbar. The following dialog window opens.

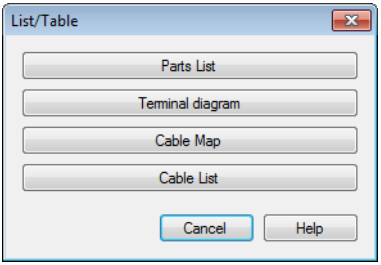

Figure 11/1: List/Table... dialog window

The following analyses can be inserted into the circuit diagram using this dialog: Parts List, Terminal diagram, Cable Map and Cable List.

The use of parts lists is described below. The use and function of the other analyses are described in the corresponding chapters.

FluidDraw creates parts lists that are automatically updated in the background while the circuits are being edited.

If a parts list has been added to a circuit diagram as described above it can be used like a symbol. The use of parts lists as a special page type is described under Display parts list.

You can customise the appearance of the parts list under "Properties..." in the "*Appearance*" tab. You can see the effects of the settings straight away in the preview on the right-hand side.

If the "*Lines per Page*" option is selected you can specify the number of lines to be displayed per page. The relevant pages will also be output when the circuit diagram is printed. Buttons for navigation are displayed underneath the page if the list is split across multiple pages.

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Figure 11/2: Buttons for navigating through lists

11.1 Display parts list

We recommend setting up one file specifically for the parts list in a project. If you wish to create a circuit drawing without creating a project you can switch the view for this circuit to the parts list view. Selecting the Parts List menu item from the View menu enables you to switch from the circuit view to the parts list view. Conversely, selecting the Circuit Diagram menu item from the View menu enables you to switch from the parts list view to the circuit view.

A parts list is displayed as a table in the window. You can edit the following options for editing the table:

- Attributes which the user can edit can be entered directly into the corresponding table field.
- Clicking on the column header sorts the rows on the basis of the column clicked. Clicking on the head of the same column again reverses the sorting order.
- You can adjust the column width by dragging the edges of a column header.
- You can change the order of the columns by dragging and dropping a column header in another position.

11.2 Find components from the parts on the circuit diagram

FluidDraw enables you to easily find components on the parts list in the circuit diagram and vice versa.

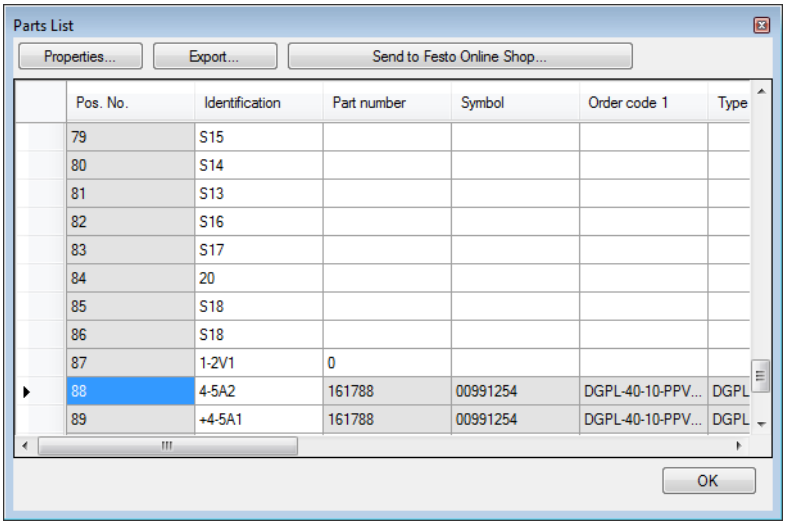

Figure 11/3: Finding components from the parts list

You have the following options:

— Clicking on the Find... button on the "*Find Target*" parts list column switches to the circuit diagram display and an animation identifies the corresponding components. If the same circuit diagram is already open in another window than the parts list view remains in the active window. The already opened window containing the circuit diagram is moved into the foreground and an animation identifies the corresponding circuit diagram symbol.

— When you click a cell in the parts list table an animation identifies the corresponding component in all of the opened windows displaying the circuit diagram.

— If you click a column header in the parts list table then both the entire column of the parts list as well as the corresponding components in the associated circuit diagram windows are selected.

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— If you click a component in a circuit diagram then both this component and the corresponding row in the open parts lists are selected.

11.3 Set parts list properties

In the parts list view clicking on the Properties... button opens the *Parts List Properties* dialog window.

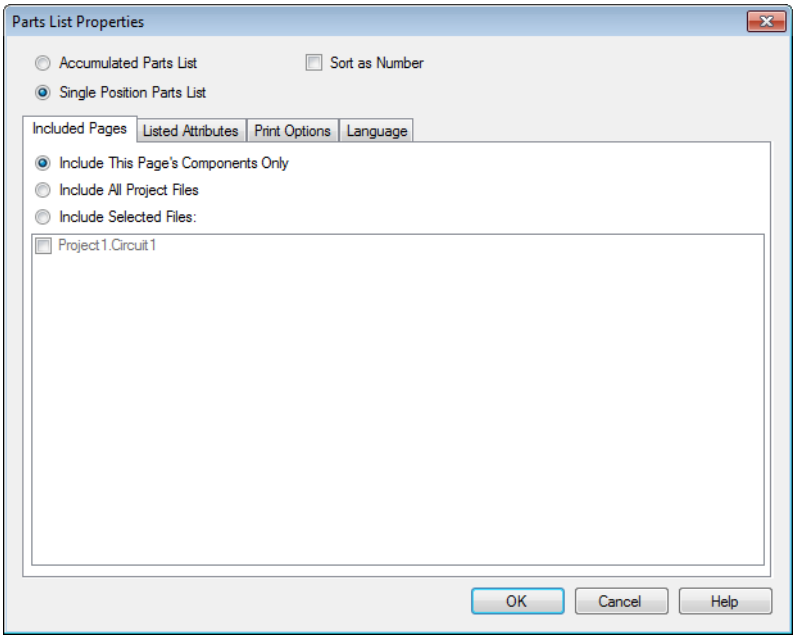

Figure 11/4: *Parts List Properties* dialog window: *Included Pages* tab

Accumulated Parts List — Compiles the components with the same attributes.

Single Position Parts List	Lists all of the components individually
Sort as Number	Interprets the column contents as numbers, so that “10” appears after “2”, for example.
Include This Page’s Components Only	Only lists the components of the corresponding circuit diagram.
Include All Project Files	Lists all of the components of the active project.
Include Selected Files:	Lists all of the components of the selected circuit diagrams belonging to the active project.

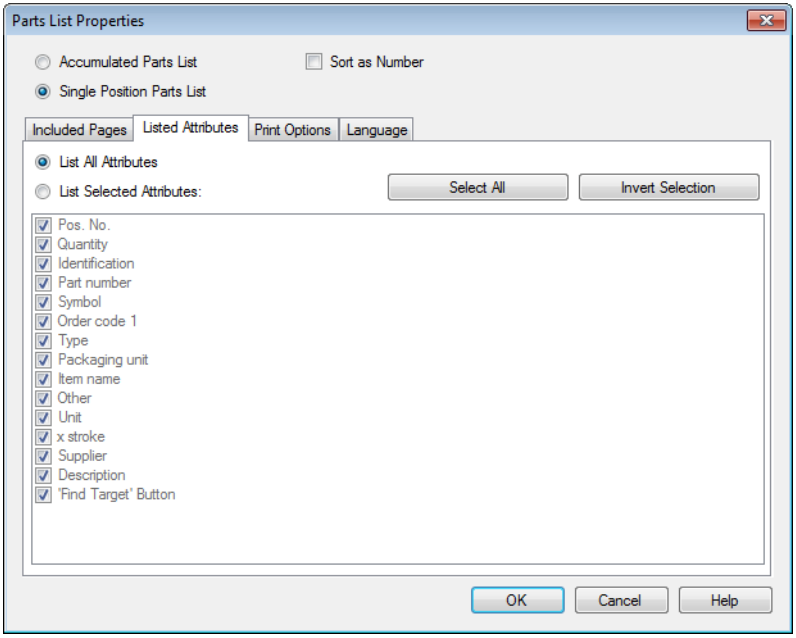

Figure 11/5: *Parts List Properties* dialog window: *Listed Attributes* tab

List All Attributes	Lists all of the component attributes within a parts list row.

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List Selected Attributes: Only lists selected component attributes within a parts list row.

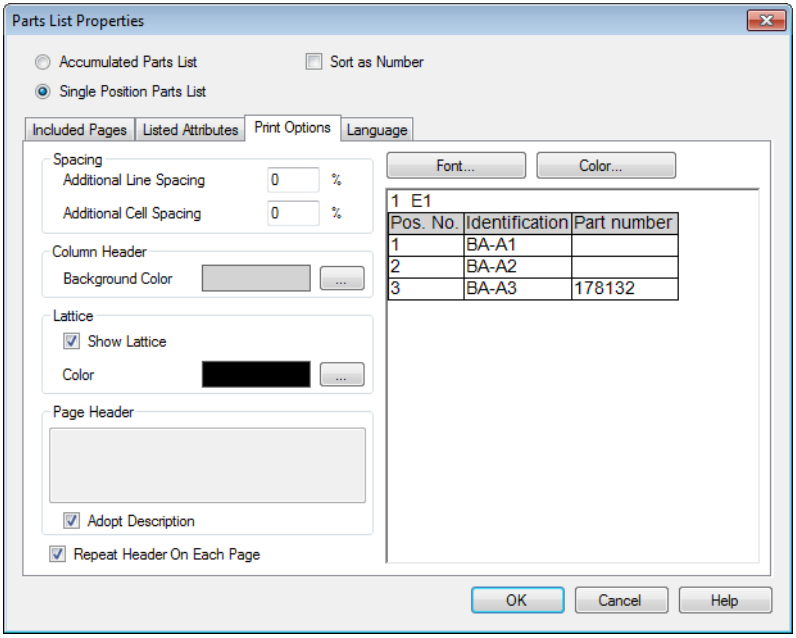

Figure 11/6: *Parts List Properties* dialog window: *Print Options* tab

In this tab you can adjust the appearance of the parts list printout. In the preview on the right-hand side you can immediately see the effects of the adjustments. You can find information regarding printing a parts list in the “Print circuit diagram and parts list” section.

11.4 Export parts list

You can export the parts list as a text file.,

⇢ Click the Export... button in the parts list view.

A dialog window for selecting a file or entering a new file name appears. After you have entered a file and left the dialog field you can define the following format settings for the export in the *Parts List Export* dialog window:

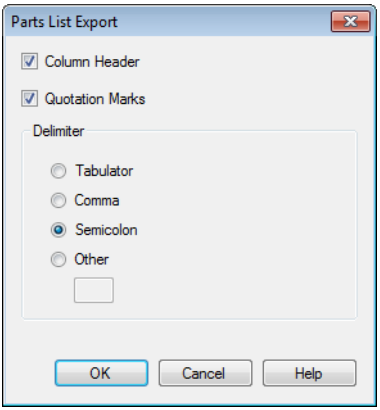

Figure 11/7: *Parts List Export* dialog window

Column Header	If this option is selected then the names of the attributes appear in the first row of the text file.
Quotation Marks	Select this option to set the field elements in quotation marks.
Delimiter	The selected separator is used to separate the columns.

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Manage projects

Chapter 12

FluidDraw supports the management of projects by compiling different files under one name in a single project file. This has the following benefits: When opening a project all of the associated data is loaded. It is possible to rapidly access files belonging to a project via the project window.Parts lists whose elements are located in different circuit diagram files can be maintained in one project.

12.1 Create new project

⇢ Select the New... / Project... menu item from the Project menu and enter a file name for the new project.

Project files possess the **prj** file suffix. By default they only contain links to files contained in the project. If you wish to pass on a project then you must either pass on all of the associated files along with the project file or activate the "*Save Projects as Single File*" option.

When creating a new project, a project folder is automatically created to store the project file and all other files belonging to the project. This automatically created project folder has the same name as the project file. If you create the project file in an empty folder this will be used for the project (i.e. another new folder will not be created underneath it). The automatic creation of project directories can be activated and deactivated in the options under Save.

In the project window a project is represented hierarchically as a list. The top element is the project node. Below this are the associated circuit nodes and parts list nodes which can be differentiated from each other via the symbol in front of the name.

12.2 Project nodes

Every project possesses one project node as the uppermost element. All of the project-specific properties are saved with the project node. Right-clicking on a project node opens a context menu. You can also find the menu items on the Project menu. Here you can find the functions for adding and removing files, among other things.

Under the Properties... menu item from the Project menu you can define properties for the project. Properties that can be specified for both projects and circuits are described under Circuit and project properties.

12.2.1 Project archiving

Project files generally consist of links to the files contained therein. However, where desired FluidDraw can also save the project along with all of the associated files in one single file. Among other things, this makes it easier to pass on the project. Activate the *Save Projects as Single File* option in the *Archiving* tab.

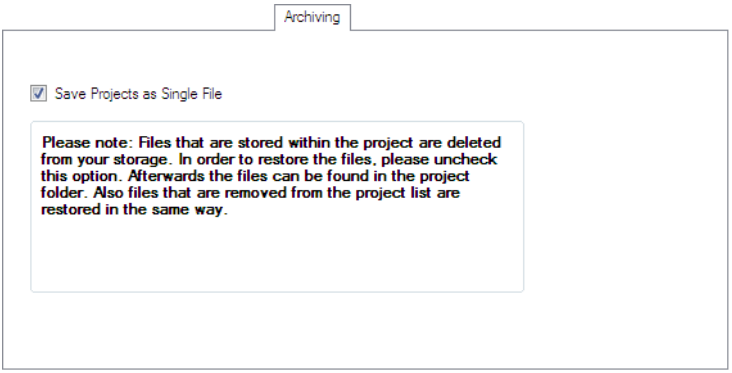
Archiving
Save Projects as Single File
Please note: Files that are stored within the project are deleted from your storage. In order to restore the files, please uncheck this option. Afterwards the files can be found in the project folder. Also files that are removed from the project list are restored in the same way.

Figure 12/1: *Project* dialog window: *Archiving* tab

Save Projects as Single File — If this option is activated all of the files belonging to the project are saved in a single file.

Please note the advice displayed under this option.

12.3 Circuit and parts list nodes

A circuit node is created beneath the project node for every circuit file that belongs to the project. This also applies to parts lists since they are saved as circuits. These are just displayed differently in the window. All of the circuit-specific or parts list-specific properties are saved with the circuit node.

Right-clicking a circuit node opens a context menu containing the following menu items:

Open... — Opens the selected circuit or the selected parts list in a window. Double-clicking on the node in the project tree also opens the window.

Close Windows — Closes the window of the selected circuit or the selected parts list.

Remove From List	Removes the selected circuit or the selected parts list from the project.
Rename...	Changes the description of the selected circuit or the selected parts list.
Properties...	In this dialog window you can enter data for the circuit or parts list. Note: Please note that the additional parts list-specific properties can be set using the window view of the parts list.

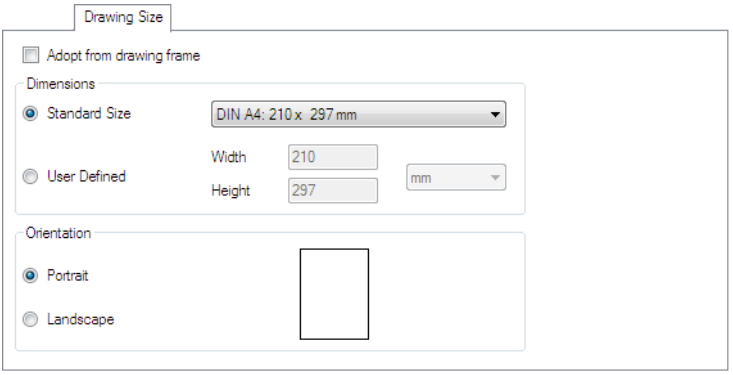

Figure 12/2: Page dialog window: *Drawing Size* tab

Here you can define the circuit dimensions and orientation, both of which are relevant for printing.

12.4 Unplaced objects

Various symbols consist of a main component and several secondary components. For solenoid valves in particular FluidDraw manages the associated solenoid coils automatically. The linking of solenoid valves with their solenoid coils is described in detail underLink solenoid valves and solenoid coils.

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If a main component is inserted into a circuit diagram, the associated coils are automatically entered in the *Unplaced Objects* symbol library.

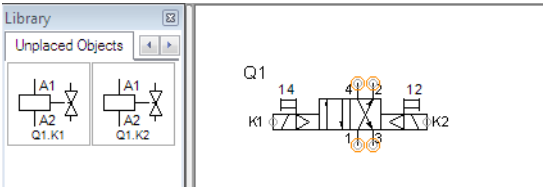

Figure 12/3: Circuit diagram with solenoid valve and associated solenoid coils in the *Unplaced Objects* symbol library

The associated coils are already internally linked with the solenoid valve in the circuit diagram. Clicking one of the “electric connectors” in the solenoid valve automatically highlights the corresponding coil in the *Unplaced Objects* library.

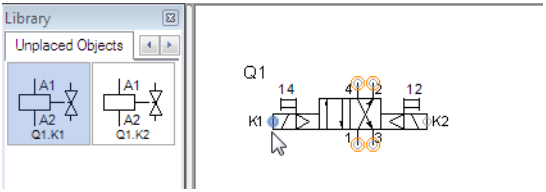

Figure 12/4: Highlighting of the connector link with associated solenoid coil

As soon as you drag a coil from the library into a circuit diagram it is “used up” and removed from the library. The valve is entered as the parent object for the coil.

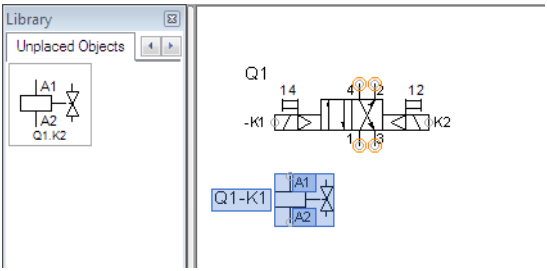

Figure 12/5: Inserting a solenoid coil

Assigning a new identification to the coil has a direct knock-on effect on the valve since the coil and valve are linked. The identification is displayed at the valve.

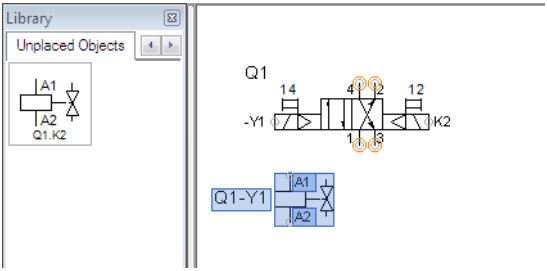

Figure 12/6: Automatic linking of solenoid valve and solenoid coil

If you delete the solenoid coil in the circuit diagram it is automatically added to the *Unplaced Objects* symbol library again. This symbol library is completely self-managing.

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Chapter 13

Circuits and projects have a host of common properties. The properties set in the project can be used by circuits in the project. All of the properties that can be specified for both circuits and projects are listed below. The screenshots shown are dialog windows for the circuits.

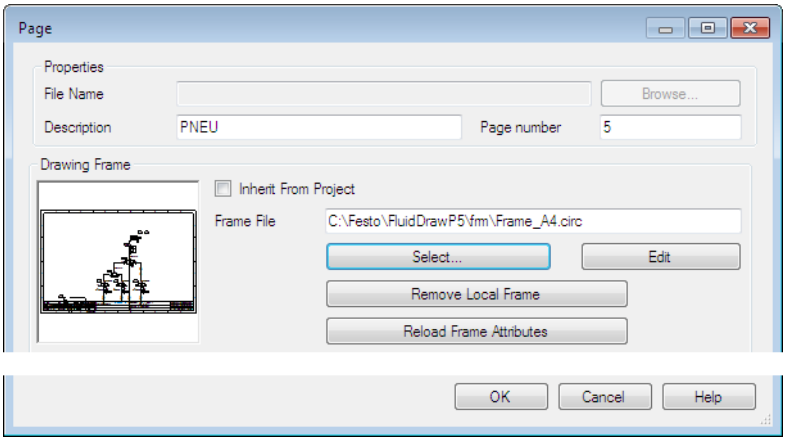

Figure 13/1: Properties dialog window

Properties

The file name field displays the file name of the circuit or project along with the complete path. The file name is carried over to the input field for the "*Description*" and can be edited there. This entry is displayed in the upper margin of the window as well as beside the circuit or project node.

Page number

Here you can specify a page number. The page number can be made up of any character string. The page number can be defined using the "%PageNumber" predefined placeholder. This placeholder can be used in text components and drawing frames among others.

Drawing Frame

Here you can make settings for the drawing frame. This function is described in the section Drawing frame.

13.1 Attributes

Any number of attributes can be created for every circuit or node in a project. The attributes are listed in a table in the "*Attributes*" tab. New attributes can be entered in the empty cells at the end of the table. The use of attributes is described in the section Attributes of the nodes in a project.

The attributes of a project node are automatically copied to all circuit and parts list nodes (inherited) and are thus available in all of the circuit drawings. This concept is particularly useful for the drawing frames if project attributes are to be displayed in the circuit diagram, for example. You can find further information in the section Link text components with attributes.

Circuit attributes copied from a project cannot be edited initially. The corresponding row in the *Attributes* tab of the Page dialog window is grayed out and the "*Inherit From Project*" option in the column is activated.

However it is possible to overwrite a copied attribute in a circuit. The option in the "*Inherit From Project*" column must be deactivated for this. The value of the attribute can then be edited. This function can be used to assign individual page numbers in the drawing frame, for example. If the "*Inherit From Project*" option is reactivated then the attribute value is copied from the project again.

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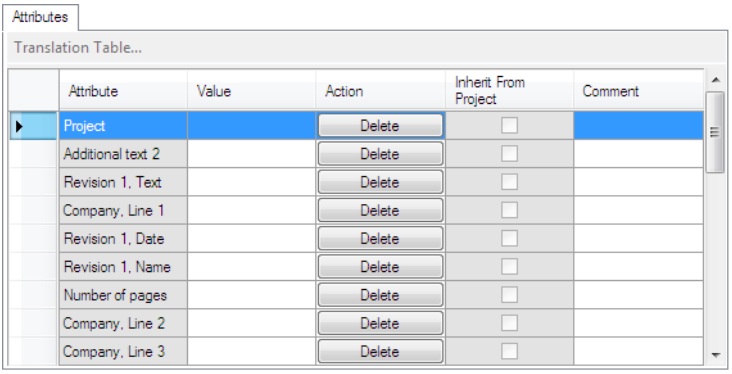

Figure 13/2: *Attributes* tab

Attribute — This column contains the name of the attribute.

Value — This column contains the value of the attribute.

Action — The buttons in this column allow the following actions: if the attribute was created in the parent project node then the "Find Target..." action is available. Clicking this opens the *Project* or *Circuit* dialog window for the project node as the target that contains the corresponding attribute. If the attribute was created in the same node then the "Delete" action that allows you to delete the attribute is available.

Inherit From Project — If the attribute was created in the same node then this option is deactivated and grayed out. This applies to all of the attributes of the project node since it does not have a parent node. For child nodes the value of the attribute from the project node is copied when this option is activated. After deactivating this option it is possible to locally overwrite the attribute value.

Comment — Here you can enter a comment about the attribute.

Translation Table... — If you are editing a text field you can use this button to open a search dialog via which you can find the text ID for a language text from the translation table.

13.1.1 Predefined placeholders

FluidDraw provides a host of predefined placeholders. These placeholders can be used intext components and drawing frames among others.

The placeholders begin with a percentage sign. The following predefined placeholders are some of those available:

%PageNumber	The page number is specified in the properties dialog window for the circuit diagram. If analyses are split across several pages, the number of the sub-page is added to the page number with a minus sign. If, for example, the entered page number is “42-01” and the page displayed is the third page in an analysis then the placeholder “%PageNumber” is replaced by the character string “42-01-03”.
%PageDescription	The description for the page is specified in the properties dialog window for the circuit diagram.
%PageFileName	Stands for the file name of the page without the file path.
%PageFullFilePath	Stands for the file name of the page with the full file path.
%PageFileDateTime	Stands for the date and time of the most recent change to the circuit diagram.
%PageFileDate	Stands for the date of the most recent change to the circuit diagram.
%PageFileTime	Stands for the time of the most recent change to the circuit diagram.

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13.2 Page Dividers

Page dividers can only be defined for pages. Editing of page dividers is described under Page dividers.

13.3 Basic Unit Length

The symbols in the FluidDraw symbol libraries are created according to various DIN ISO standards. Instead of specifying absolute units of length, the standards simply use a relative basic unit of length “M”. All of the symbols have been created with reference to this basic unit of length “M”. The actual size of the symbol is not defined until the symbol is inserted into a circuit.

Information on how to convert the basic unit of length “M” is stored with the circuit diagram. You can change the set values for a circuit diagram by calling up the properties dialog window for the circuit diagram using the Page | Properties... menu. You will find the relevant settings in the *Basic Unit Length* tab.

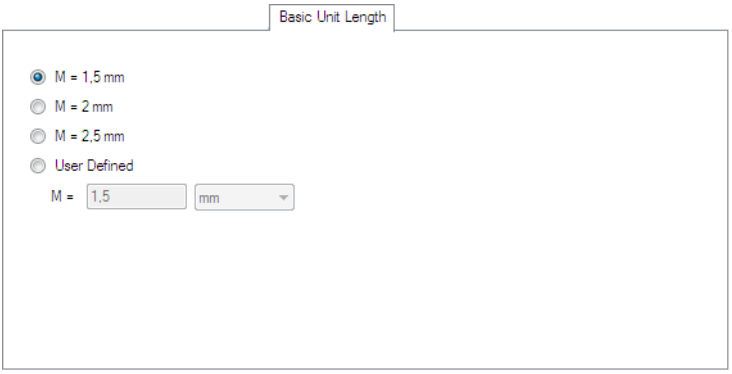

Figure 13/3: *Basic Unit Length* tab

As soon as the value of “M” is changed, the sizes of the existing symbols are recalculated with respect to the specified basic unit of length. The specification has no effect on elements in the drawing frame.

The *Basic Unit Length* tab is also in the project settings. The settings made in this tab are used as a template for circuit diagrams created from new in the project tree.

13.4 Language

The language settings are found in the *Language* tab. The settings made in this tab affect language-dependent text, etc. in parts lists. The language used for program elements such as buttons is defined via the program options, see Language.

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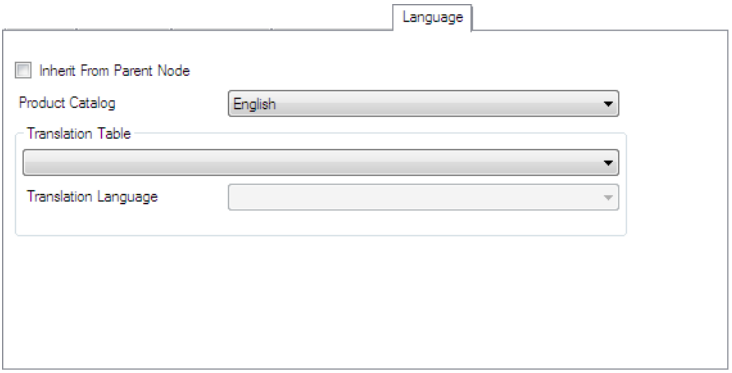

Figure 13/4: *Language* tab

Inherit From Parent Node	Copies the language settings from the parent project node.
Product Catalog	Defines the language used for the Festo product catalogue. All of the product attributes are displayed in the relevant language. The predefined attributes are also displayed in this language.
Translation Table	Defines the translation table to be used.
Translation Language	Defines the language from the selected translation table to be used. The user-defined attributes are displayed in the selected language.

13.5 Encryption

Projects and circuit diagrams can be encrypted. The encryption method used is AES-128.

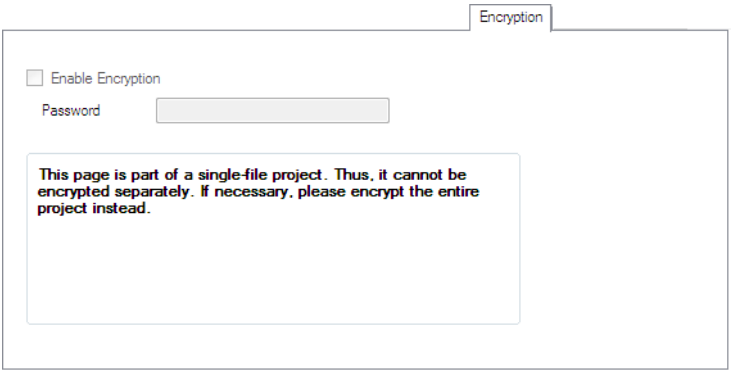
Encryption
Enable Encryption
Password
This page is part of a single-file project. Thus, it cannot be encrypted separately. If necessary, please encrypt the entire project instead.

Figure 13/5: *Encryption* tab

Enable Encryption

This option activates and deactivates encryption. When encryption is activated the password to be used can be entered in the *Password* input field.

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13.6 Designation Conventions

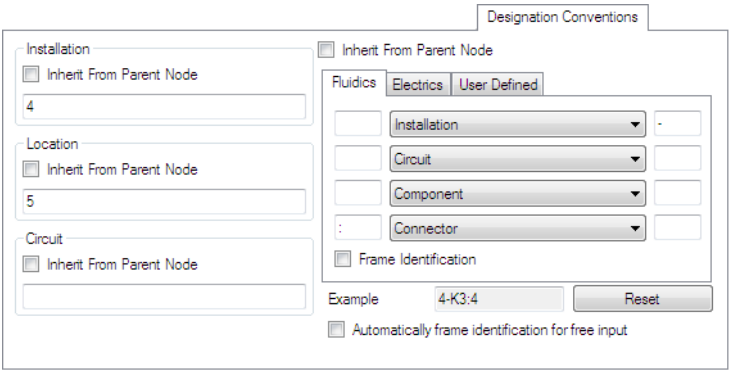

Figure 13/6: *Designation Conventions* tab

This tab is used to define the settings for the designation conventions. Further information can be found under Equipment identifications and designation conventions.

Settings can be made for the following sets of conventions: *Fluidics*, *Electrics* and *User Defined*. If the *Inherit From Parent Node* option is active then the sets of conventions will be copied from the parent project node.

Frame Identification

Defines that the identifications produced by the selected set of conventions will be framed.

Specifications can be made for *Installation*, *Location* and *Circuit* that will be evaluated for displaying the symbol identifications. If the *Inherit From Parent Node* option is active then the specification will be copied from the parent project node.

Example

The example shown illustrates the effects of the selected designation conventions.

Automatically frame identification for free input	If “free input” is chosen for a symbol identification then this option determines whether these identifications should be framed.

13.7 Cross Reference Representation

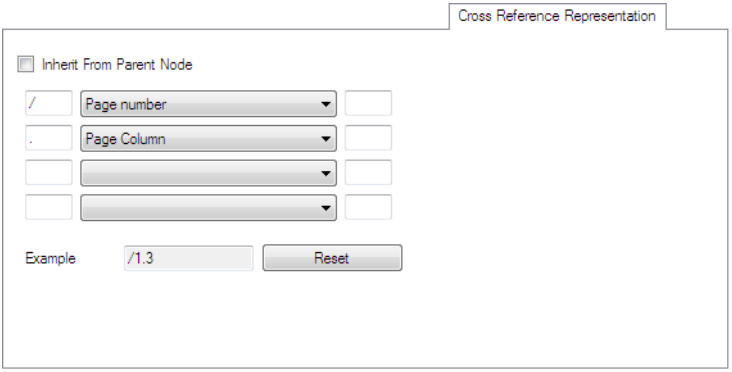

Figure 13/7: *Cross Reference Representation* tab

This tab is used to define the settings for the cross-reference representation. You can find further information under Cross-reference representation. If the *Inherit From Parent Node* option is active then the settings will be copied from the parent project node.

Example	Illustrates the effects of the settings using an example.
Reset	Resets the settings to the settings defined in FluidDraw.

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Special functions for electric circuits

Chapter 14

14.1 Potentials and conduction lines

The creation of horizontal and vertical potential lines is supported by drawing conduction lines. The end points of the conduction line consist of potentials that also serve as interruptions. In the dialog window for drawing conduction lines you can specify whether the potentials should have an identification.

In this example we want to draw three horizontal potential lines where each line comes from a preceding sheet “1” and is continued on a sheet “3”.

You open a dialog window where you can make the settings shown using the Insert Conduction Line... menu item or the button on the toolbar.

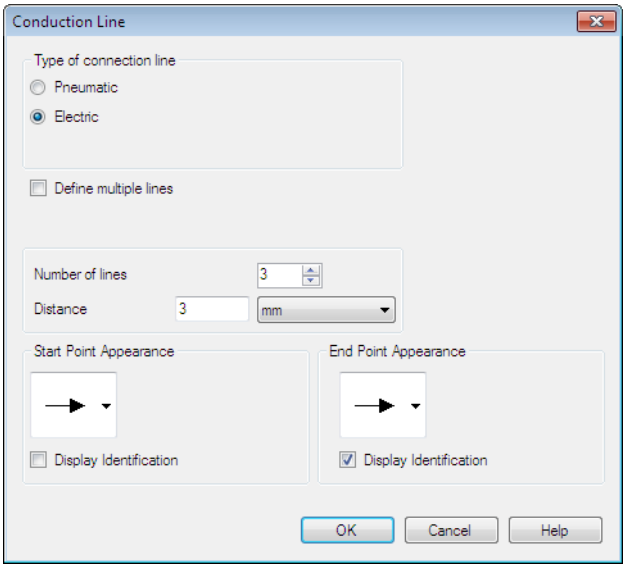

Figure 14/1: Settings for the potential lines to be created

You can then define the end points of the line with two consecutive mouse clicks.

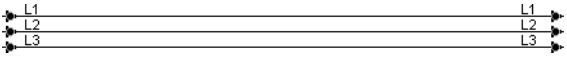

Figure 14/2: Three horizontal potential lines

The identifications of the potentials can be changed. In this example we want to rename the potential from L4 to L6.

⇢ Double-click the left-hand potential L1. Then enter L4 for the identification in the dialog window.

Then following prompt then opens.

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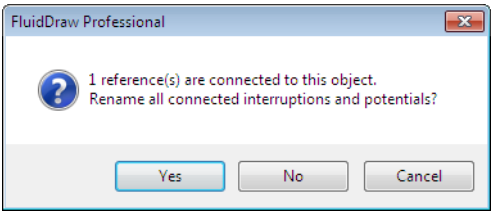

Figure 14/3:

FluidDraw supports the automatic renaming of the potentials linked with the source potential. If you answer “Yes”, the potential L1 on the right-hand side will also be renamed L4.

- Rename the potentials L2 and L3 to L5 and L6 in the same way.

- Then enter the corresponding markers for the predecessors or successors in the properties dialog windows for the potentials. If the corresponding cross-references have the same markers in the respective predecessor and successor pages, the potential lines might look as follows.

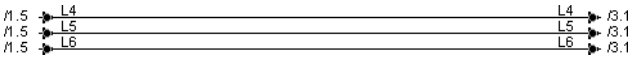

Figure 14/4: Three horizontal potential lines with cross-references

14.2 Cables and wiring

Cables and wiring are represented in the circuit diagram by a special cable symbol. All of the lines defined by the cable symbol are assigned to a cable or to wiring. You can define for the symbol whether it is a cable or wiring.

Wiring only summarizes the defined lines (wires) graphically in the circuit diagram and is assigned the identification “W” by default. Wiring is not listed in analyses such as cable maps and cable lists. Unlike a cable, wiring cannot be assigned to a product. With wiring, product information can only be saved in the lines.

If the cable symbol represents a cable then a cable object must be assigned to the symbol. Product properties can be saved in the cable object and are analyzed in cable maps and cable lists, etc. Several cable symbols can reference the same cable object. This is the case if, for example, a cable has to be spread over several pages.

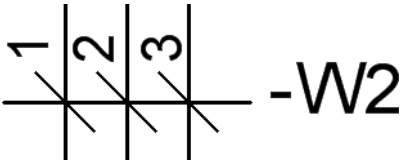

Figure 14/5: Cable symbol

⇢ Select the Cable menu item from the Insert menu or click the button to define a cable or wiring.

This activates a mode that allows you to insert a cable symbol by making two consecutive clicks. All of the lines that are defined by the cable symbol are initially assigned to wiring.

If you want to use a cable instead of wiring you can assign a cable object to the symbol using the properties dialog window for the cable symbol.

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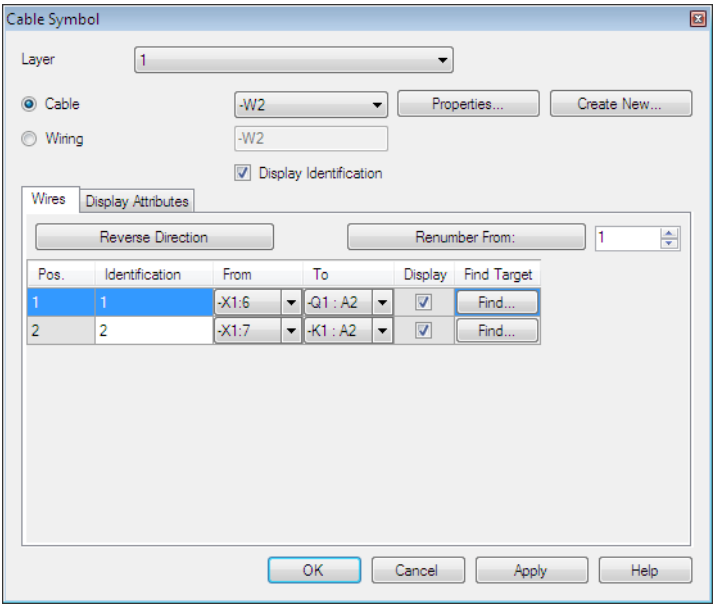

Figure 14/6: *Cable Symbol* dialog window, *Wires* tab

Layer

Defines the drawing layer for the cable symbol.

Cable – Wiring

Defines whether the cable symbol represents a cable or wiring comprising single wires. Wiring is not listed in cable maps, etc. If *Wiring* is selected then an identification can be specified that can be displayed with *Display Identification*.

If *Cable* is selected then an existing cable object can be assigned to the cable symbol using a drop-down list. A new cable object can be created using the Create New... button. Clicking Properties... opens the properties dialog window for the selected cable object.

Wires

In order to analyze cable maps the component connections that join a wire must be determined. The connectors are automatically entered in the list box if they can be uniquely assigned. If a unique assignment is not possible, the relevant connector must be selected manually via the list box. The identification for the individual

wires can also be entered. These are saved in the individual lines (wires). The wire identifications are displayed at the cable symbol using the *Display* button.

Reverse Direction

The entries in the *From* and *To* column are automatically defined as the direction of the wires when creating the cable symbol. Clicking the Reverse Direction button reverses the directions of all of the wires.

Renumber From:

Clicking this button renumbers all of the wires defined by the cable symbol, starting with the number entered in the list box.

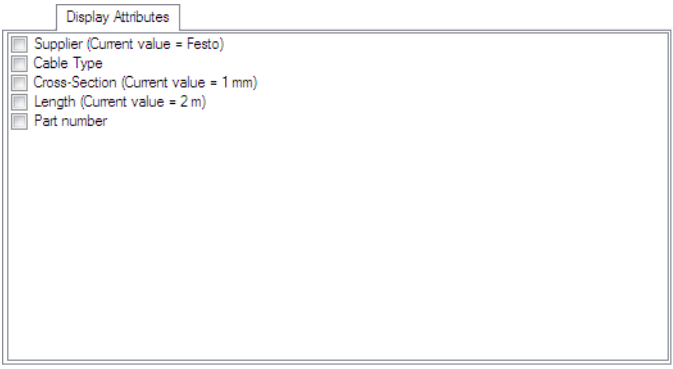

Figure 14/7: *Cable Symbol* dialog window, *Display Attributes* tab

In the "*Display Attributes*" tab you can select the attributes of the associated cable object that are to be displayed at the cable symbol.

⇢ Click the Create New... button to create a new cable symbol.

The following dialog window opens.

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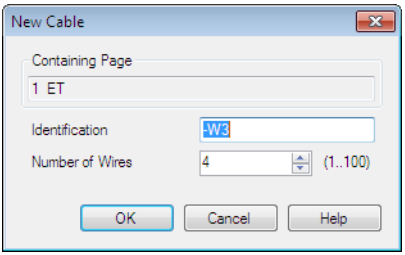

Figure 14/8: *New Cable* dialog window

Containing Page

Indicates the page where the cable object will be saved. This is important if various cable symbols on different pages reference the same cable object. The cable object is only saved with one page.

Identification

Enter the identification for the cable here.

Number of Wires

Enter the number of lines (wires) in the cable here. The number can be higher than the underlying lines if, for example, a concrete cable has unconnected wires. If the associated cable symbols overscore more lines than are defined in the cable object, a warning is output when the page is checked and the corresponding entries are highlighted in color in the cable lists.

After you specify the identification for the cable and confirm the dialog, the cable object is generated and the cable symbol is assigned to it.

⇢ Click the “ Properties... ” button to edit the properties of the cable object.

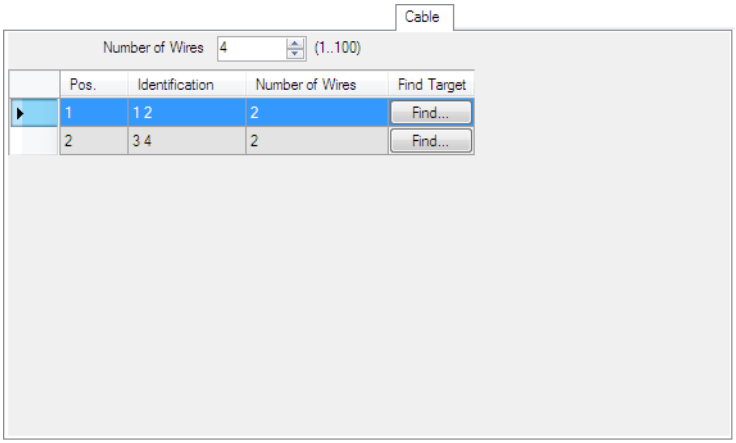

Figure 14/9: *Properties* dialog window: *Cable* tab

Number of Wires

Defines the number of lines (wires) in the cable. The number can be higher than the lines overscored by the associated cable symbols if, for example, a concrete cable has unconnected wires. If the associated cable symbols overscore more lines than are defined in the cable object, a warning is output when the page is checked and the corresponding entries are highlighted in color in the cable lists.

The associated cable symbols are listed in rows in the table. You can jump to the associated cable symbol using the "Find..." button.

The *User Defined Properties* tab in the properties dialog window for the cable symbol lists the cable-specific product properties such as *Cable Type* and *Length*. These properties and the entries in the *Cable* tab are analyzed in the cable map, etc.

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14.2.1 Manage cables

All cables within a circuit can be listed and renamed using the Manage Cables... menu item from the Page menu. You open the properties dialog window for the relevant cable object using the Properties... button.

You can also call up the cables of all circuits belonging to the project using the Manage Cables... menu item from the Project menu.

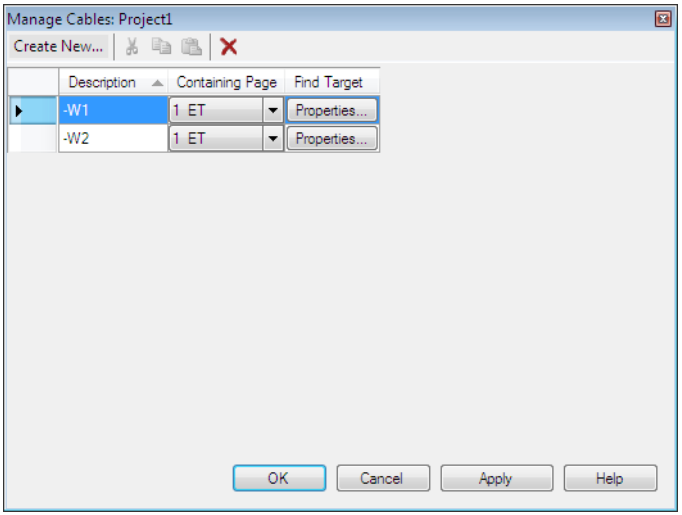

Figure 14/10: Manage Cables... dialog window

Containing Page

Shows which circuit the cable is assigned to. You can edit this assignment within a project.

You can add a new cable object to the project using the Create New... button. Each cable object must be assigned to a page.

Clicking the Create New... button first opens the following dialog window where you can define the assignment.

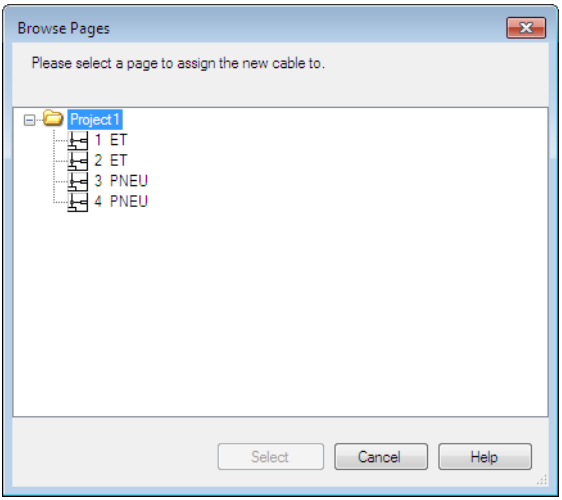

Figure 14/11: *Browse Pages* dialog window

After you click the Select button a dialog window opens where you can define the name and number of wires for the new cable object. The dialog window is described under Cables and wiring.

14.2.2 Insert cable map

You can insert an associated cable map for a cable into the circuit diagram. You do this by inserting a cable map into a circuit diagram and then assigning a cable to this map.

⇢ To insert a cable map into the circuit diagram select the Cable Map menu item from the Insert menu. Alternatively you can

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click the button. Select Cable Map in the selection dialog window that opens.

The mouse pointer changes to a crosshair. Click the position in the circuit diagram where you want to insert the cable map. A dialog window then opens where you can assign the relevant cable and customise the appearance.

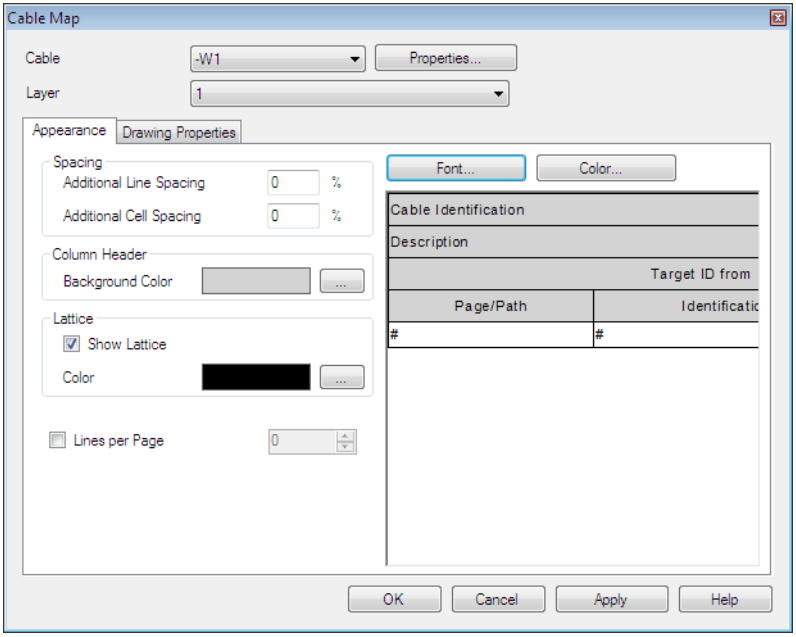

Figure 14/12: Cable Map dialog window

Cable — Defines the relevant cable.

Properties... — Opens the properties dialog window for the associated cable symbol.

You can customise the appearance of the cable map in the "*Appearance*" tab. You can see the effects of the settings straight away in the preview on the right-hand side.

If the "*Lines per Page*" option is selected you can specify the number of lines to be displayed per page. The relevant pages will also be output when the circuit diagram is printed. Buttons for navigation are displayed underneath the page if the list is split across multiple pages.

Figure 14/13: Buttons for navigating through lists

14.2.3 Insert cable list

You can insert a cable list into a cable map.

→ To insert a cable list into the circuit diagram select the Cable List menu item from the Insert menu. Alternatively you can click the button. Select Cable List in the selection dialog window that opens.

The mouse pointer changes to a crosshair. Click the position in the circuit diagram where you want to insert the cable list. A dialog window then opens where you can select the associated cable and customise the appearance.

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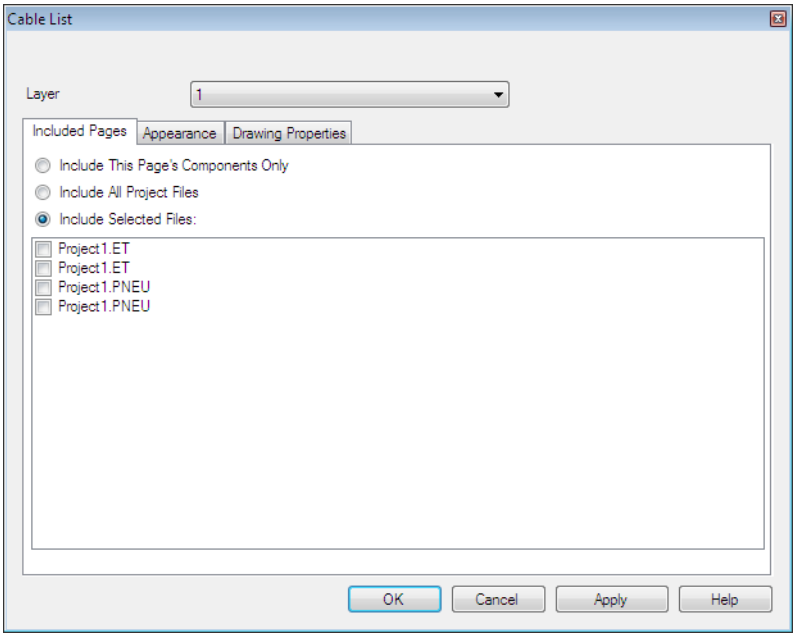

Figure 14/14: Cable List dialog window, *Included Pages* tab

Include This Page's Components Only	Lists only the cables in the associated circuit.
Include All Project Files	Lists all cables in the active project.
Include Selected Files:	Lists all cables in the selected circuit in the active project.

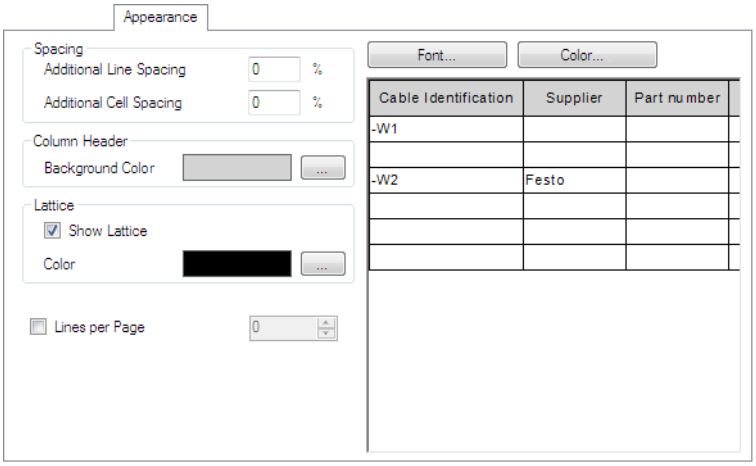

Figure 14/15: Cable List dialog window, *Appearance* tab

You can customise the appearance of the cable map in the "*Appearance*" tab. You can see the effects of the settings straight away in the preview on the right-hand side.

If the cable symbols of a cable object overscore more lines than are defined in the cable object, a warning is output when the page is checked and the corresponding entries are highlighted in color in the cable list.

If the "*Lines per Page*" option is selected you can specify the number of lines to be displayed per page. The relevant pages will also be output when the circuit diagram is printed. Buttons for navigation are displayed underneath the page if the list is split across multiple pages.

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Figure 14/16: Buttons for navigating through lists

14.3 Terminals and terminal strips

14.3.1 Set terminals

You can set individual terminals or multiple terminals in one step.

⇢ Select the Terminal menu item from the Insert menu or click the button to define an individual electric terminal.

This activates a mode that allows you to insert a terminal by clicking a free point on the electric line.

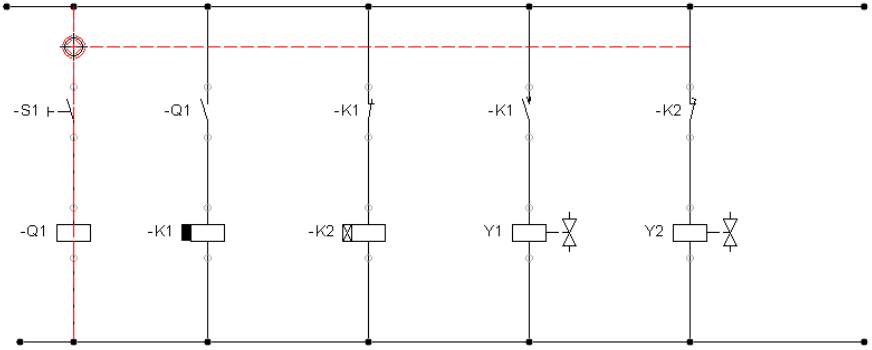

Figure 14/17:

As soon as you have set a new terminal in this way the dialog window containing the settings for this terminal appears. You can use this dialog window to assign the terminal to a terminal strip. This assignment can also be made or changed later.

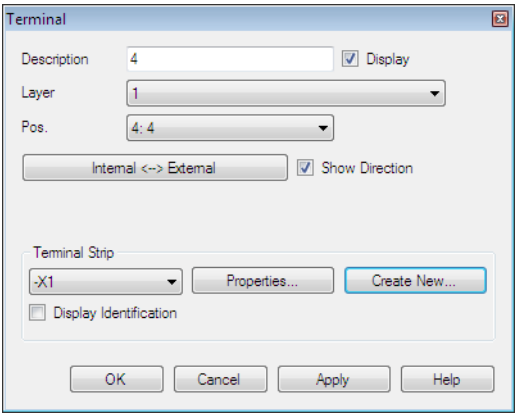

Figure 14/18: *Terminal* dialog window

Description	Contains the description of the terminal or the terminal designation.
Display	If this box is checked then the description entered will be displayed beside the terminal.
Layer	Defines the drawing layer for the line.
Pos.	Defines the position of the terminal within the associated terminal strip. An entry is only possible once the terminal has been assigned to a terminal strip.
Internal # External	Changes the direction of the terminal. The direction is indicated in the circuit by an arrow that shows which connector is inside the control cabinet and which is outside. The tip of the arrow points into the control cabinet.
Show Direction	If this box is checked then the direction arrow is displayed at the terminal.
Terminal Strip	Defines the terminal strip containing the terminal in question. The list contains the terminal strips already created. You call up the properties dialog window for the selected terminal strip using

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Properties... . You can also create a new terminal strip using Create New... .

Display Identification

If this box is checked then the identification for the associated terminal strip is displayed beside the terminal.

14.3.2 Set multiple terminals

As well as the option of setting individual terminals, FluidDraw also offers a mode that allows you to set multiple terminals one after the other. You can keep inserting terminals by simply clicking on the electric lines until you leave the mode again.

- To insert multiple terminals select the Multiple Terminals... menu item from the Insert menu or click the button.

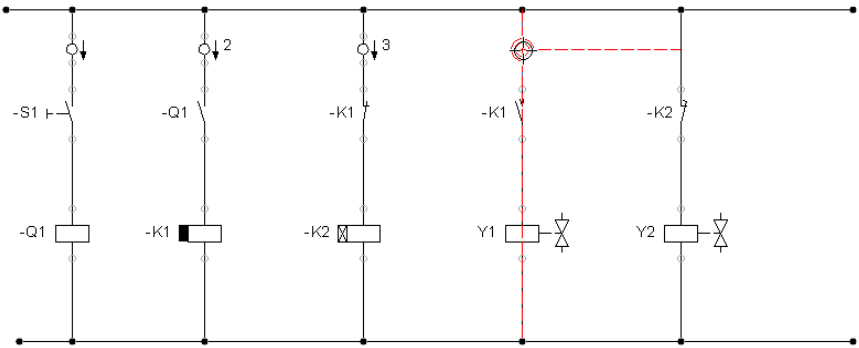

Figure 14/19:

The operation begins with a dialog window where you can make some settings for the new terminals. Above all you need to first select an existing terminal strip or create a new one. If a suitable

terminal strip does not already exist then a prompt to create a new one will automatically appear.

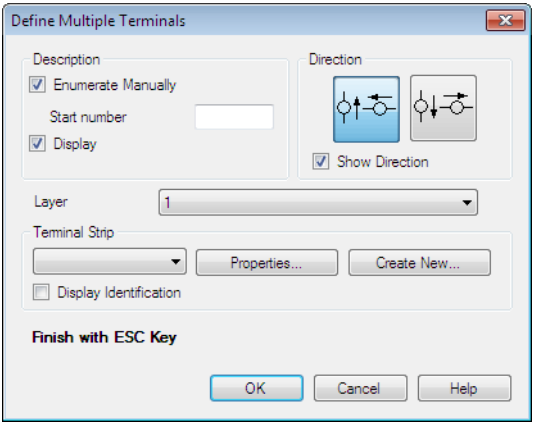

Figure 14/20: *Define Multiple Terminals* dialog window

Description

Defines how the new terminals are to be numbered. The *Enumerate Manually* option allows you to specify a start number from which the numbering continues. Otherwise a free terminal from the selected terminal strip is automatically used. The start number “2” was specified in the example shown.

Display

If this box is checked then the description entered will be displayed beside the terminal.

Direction

Defines the direction of the new terminals. The direction is indicated in the circuit by an arrow that shows which connector is inside the control cabinet and which is outside. The tip of the arrow points into the control cabinet. The direction can also be changed later using the properties dialog window for the individual terminals.

Layer

Defines the drawing layer for the line.

Terminal Strip

Defines the terminal strip containing the terminals in question. The list contains the terminal strips already created. You call up the properties dialog window for the selected terminal strip using

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Properties... . You can also create a new terminal strip using Create New... .

Display Identification — If this box is checked then the identification for the associated terminal strip is displayed beside the new terminals.

14.3.3 Create terminal strips

FluidDraw does not treat terminal strips as visible objects within the circuit pages which explains why they cannot be interactively selected using the mouse in order to highlight them, delete them or change their properties. Terminal strips can either be managed via the associatedterminals or using the Manage Terminal Strips... menu item under Page or Project.

A terminal strip is always part of a specific circuit. To define a new terminal strip you must therefore define a circuit file in addition to the description and number of terminals.

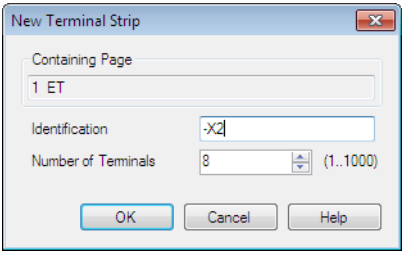

Figure 14/21: *New Terminal Strip* dialog window

All properties can also be changed later at any time. You open the properties dialog window for a terminal strip via any terminal in that terminal strip using the Properties... button.

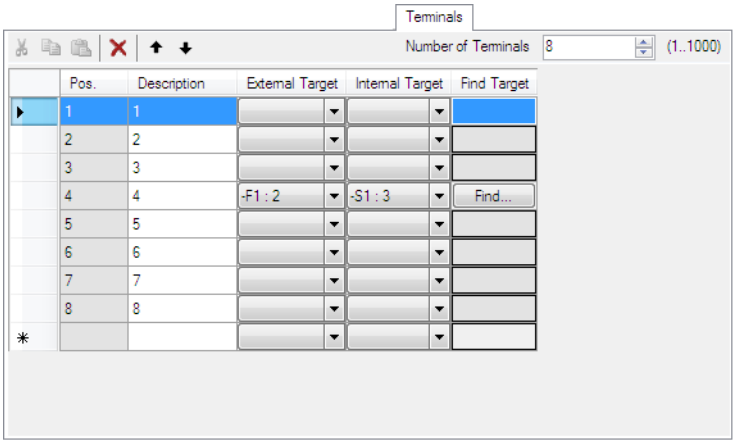

Figure 14/22: *Terminal Strip* dialog window

External Target

If the target of a terminal *inside* the control cabinet is unique due to the wiring, FluidDraw automatically enters the identification for the connected component. Otherwise the list contains the identifications of all objects that can be reached from the terminal. The target search can be controlled by selecting a junction symbol as a T distributor.

Internal Target

The targets of the terminals *outside* the control cabinet are listed here. As with the internal targets, unique links are automatically entered.

Find...

Jumps to the associated terminal in the circuit diagram.

14.3.4 Manage terminal strips

All terminal strips within a circuit can be listed and renamed using the Manage Terminal Strips... menu item from the Page menu. You open the properties dialog window for the relevant terminal strip using the Properties... button.

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You can also call up the cables of all terminal strips belonging to the project using the Manage Terminal Strips... menu item from the Project menu.

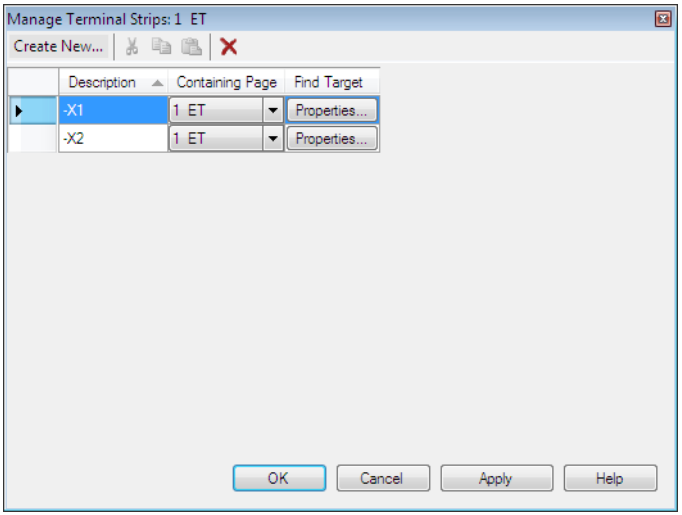

Figure 14/23: Manage Terminal Strips... dialog window

Containing Page

Shows which circuit the terminal strip is assigned to. You can edit this assignment within a project.

You can add a new terminal strip to the project using the Create New... button. Each terminal strip must be assigned to a page. Clicking the Create New... button first opens the following dialog window where you can define the assignment.

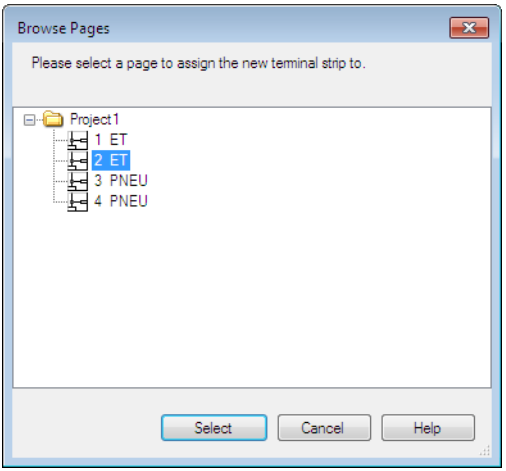

Figure 14/24: *Browse Pages* dialog window

After you click the Select button a dialog window opens where you can define the properties of the new terminal strip. The dialog window is described under Create terminal strips.

14.4 Terminal diagram

You can insert an associated terminal diagram for a terminal strip into the circuit diagram. You do this by inserting a terminal diagram into a circuit diagram and then assigning a terminal strip to this diagram.

⇢ Select the Terminal diagram menu item from the Insert menu or click the button to insert a terminal diagram into the circuit diagram. Alternatively you can click the button. Select Terminal diagram in the selection dialog window that opens.

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The mouse pointer changes to a crosshair. Click the position in the circuit diagram where you want to insert the terminal diagram. A dialog window then opens where you can assign the relevant terminal strip and customise the appearance.

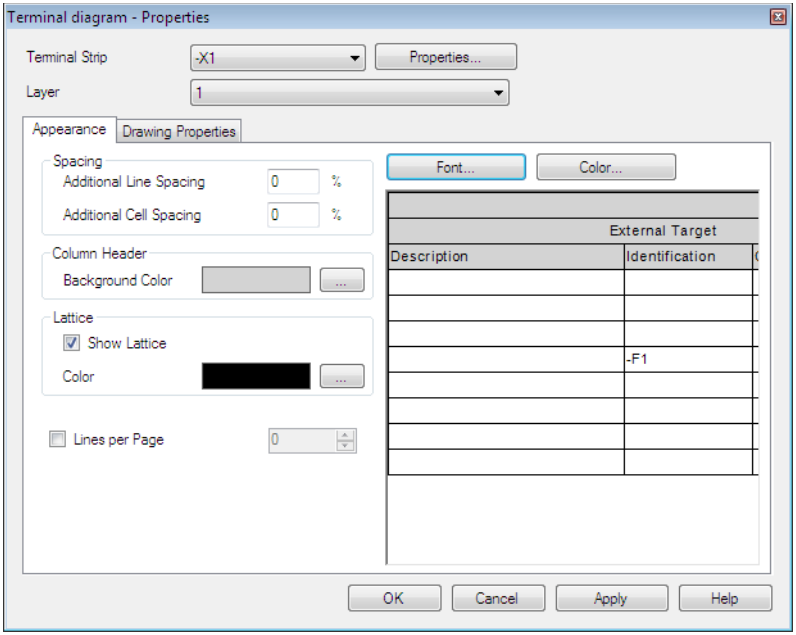

Figure 14/25: *Terminal diagram - Properties* dialog window

Terminal Strip

Defines the associated terminal strip.

Properties...

Opens the properties dialog window for the associated terminal strip.

You can customise the appearance of the terminal diagram in the "*Print Options*" tab. You can see the effects of the settings straight away in the preview on the right-hand side.

If the "*Lines per Page*" option is selected you can specify the number of lines to be displayed per page. The relevant pages will also

be output when the circuit diagram is printed. Buttons for navigation are displayed underneath the page if the list is split across multiple pages.

The entries in the "*Description*", "*Identification*" and "*Connector*" columns are taken from the object properties of the associated targets.

14.4.1 Set links

You can set so-called *links* in a terminal strip. These links are drawn in the circuit diagram as regular electric lines and marked as links. The representation of the T distributors can be customized using their properties dialog window.

The following example shows a circuit diagram with a terminal strip X1 with 10 terminals and the associated terminal diagram. A link plug is to be placed at level "1" between terminals "7" and "8" and at level "2" between terminals "8" and "9", and a wire link is to be placed between terminals "9" and "10".

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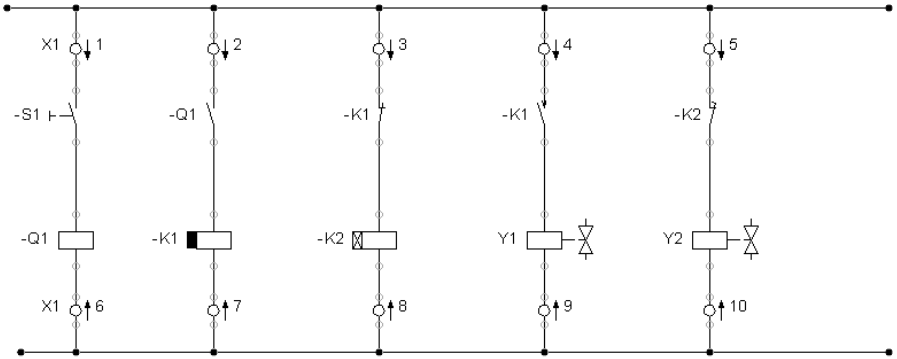

Terminal Strip -X1				
	Terminal	Links		
		Link Plug	Wire Link	Identification
	1			-S1
	2			-Q1
	3			-K1
	4			-K1
	5			-K2
	6			-Q1
	7			-K1
	8			-K2
	9			-Y1
	10			-Y2

Figure 14/26:

⇢ Double-click the electric line between terminals “7” and “8”.

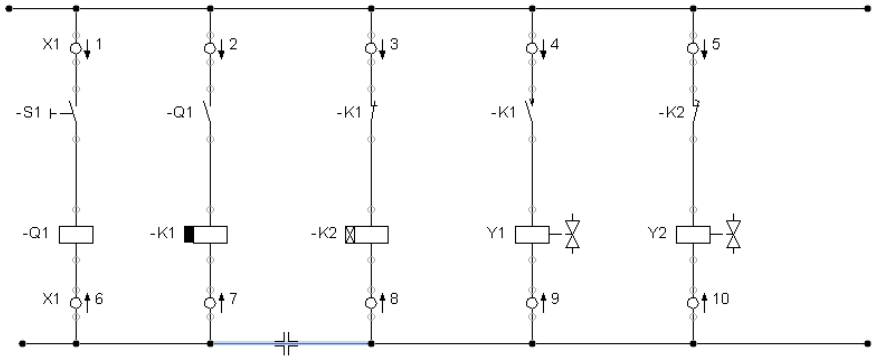

Figure 14/27:

The properties dialog window for the electric line opens. The options for setting the links are in the top right:

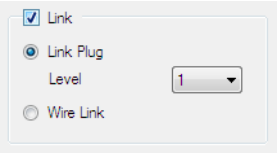

Figure 14/28: Detail of the *Line (electric)* dialog window

Link	Defines that this line is to be treated as a link.
Link Plug	Defines that the link is a link plug.
Level	Specifies the level if a link plug was selected.
Wire Link	Defines that the link is a wire link.

⇢ Set "*Link*", "*Link Plug*" and "*Level* 3".

FluidDraw tracks the line across one distributor point at most. This means that the specified link will find the contacts "7" and "8". This link will be represented in the terminal diagram as follows.

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Terminal Strip -X1			
Terminal	Links		
	Link Plug	Wire Link	Identification
1			-S1
2			-Q1
3			-K1
4			-K1
5			-K2
6			-Q1
7			-K1
8			-K2
9			-Y1
10			-Y2

Figure 14/29:

⇢ Proceed in the same way to set a link plug between “8” and “9” at level “2” and a wire link between “9” and “10”.

The terminal diagram then has the following appearance.

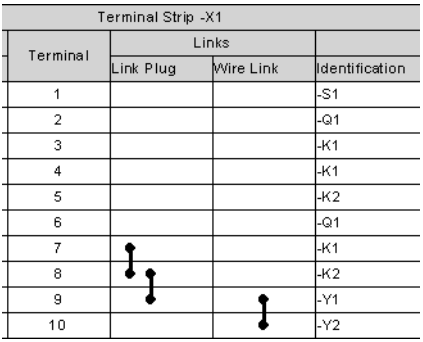

Figure 14/30:

14.5 Contact images

The contact images can be displayed within a circuit diagram beneath relay coils and similar symbols. The contact images list all the contacts of the associated relay coil and show which current paths these contacts are in. The division of the page or circuit diagram can be defined using the page dividers.

⇢ To do this select the Display Contact Images menu item from the View menu.

The contact images of the current circuit diagram are shown or hidden.

Contact images can be highlighted, moved and aligned like other symbols.

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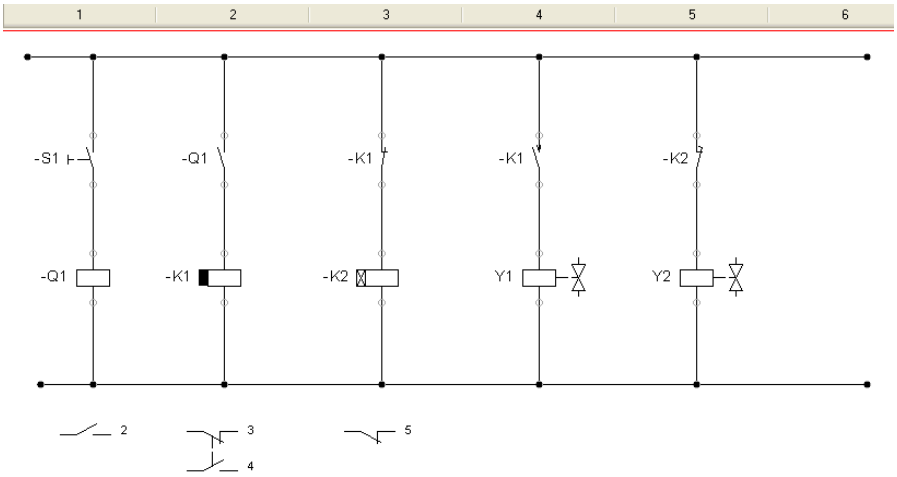

Figure 14/31:

You can have all of the contacts in a contact image displayed in a list and customise the appearance by double-clicking the contact image or highlighting the contact image and selecting the Properties... menu item from the Edit menu.

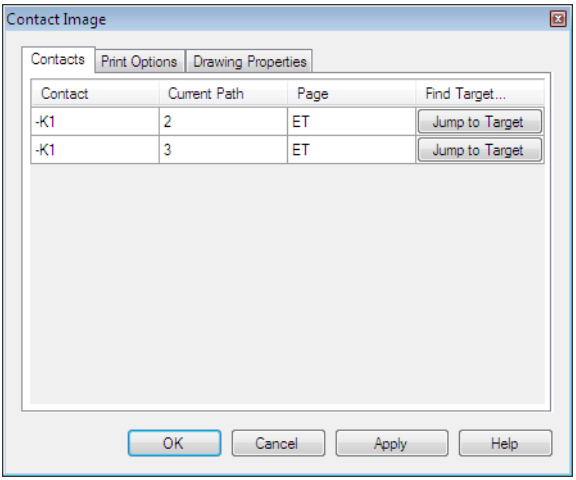

Figure 14/32: *Contact Image* dialog window

You can customise the representation of the contact image in the "*Print Options*" tab.

The "*Contacts*" tab lists all of the associated contacts. You can jump to the corresponding contact in the circuit diagram using the Jump to Target button.

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Circuit input and output

Chapter 15

15.1 Print circuit diagram and parts list

FluidDraw circuits and parts lists can be printed by opening the *Print* dialog window via the Print... menu item on the File menu.

In FluidDraw a parts list is the representation of a circuit as a table. If you wish to print an individual parts list then the corresponding circuit must be shown in theparts list display.

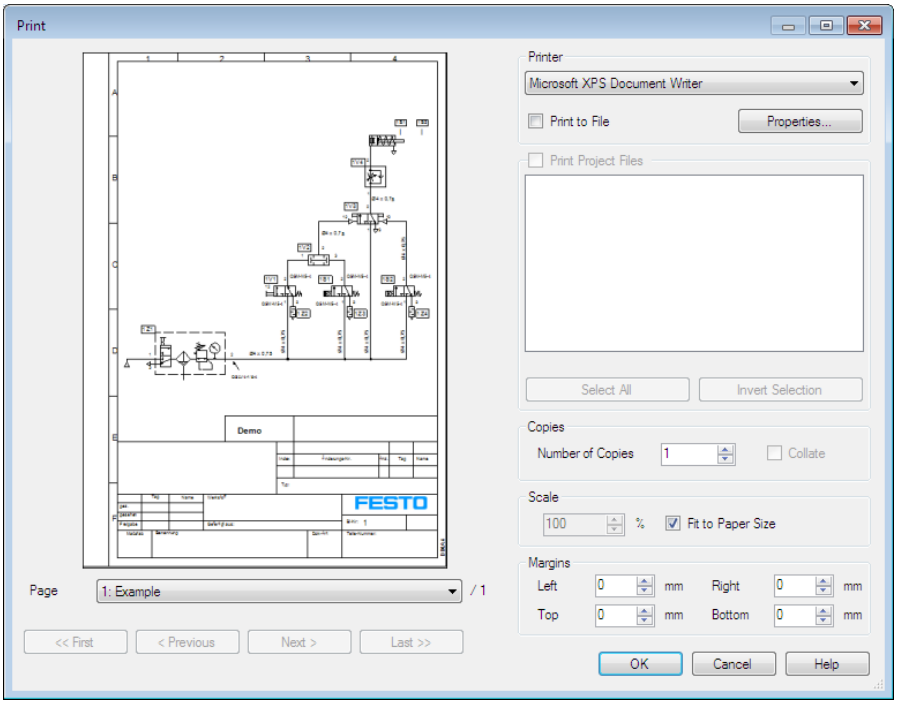

Figure 15/1: *Print* dialog window:

Printer	Select the desired output device from the list of the available printers.
Properties...	This button enables you to open the dialog window for setting the printer options.
Print to File	Activate this option if you wish to write the print data to a file.
Print Project Files	When you work in a project you can select which circuits and parts lists are to be printed.
Copies	

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	Select the number of copies. If the printout consists of multiple pages you can cause FluidDraw to print a correspondingly sorted sequence.
Scale	You can increase or decrease the output size by entering a scaling factor. If the dimensions of the area to be printed are larger than the printable area on the paper then the printout is spread across multiple pages (tiled). You can see the page divisions in the print preview. Note: Please note that it may not always be possible to precisely comply with the page margins. Therefore you should plan a certain amount of leeway for the page margin.
Page	Here you can specify additional margins in order to manually customise the print area.
Margins	You can select which page the print preview displays.

15.2 Import DXF file

Files saved in the DXF format can be imported and retain most of their element attributes. If several special points were taken into account when creating the drawing using a CAD program then FluidDraw can easily expand the symbol library.

15.3 Export circuit

The FluidDraw circuits can be saved as a file with a variety of different formats. The BMP, JPG, GIF, WMF, PNG, DXF, TIF and PDF formats are available. Once you have selected the Export... menu item from the File menu a dialog window opens where you can define the different settings for the export. The settings depend on the format selected.

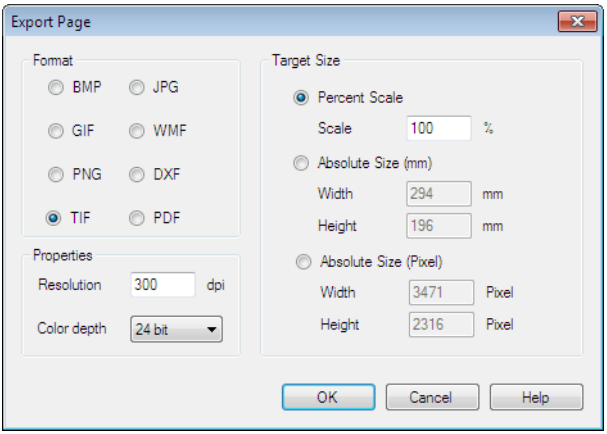

Figure 15/2: *Export Page* dialog window

You are then prompted to select a file name or enter a new one.

Select a suitable resolution for the image file.

Please note that a high resolution generates extremely large files which mean the export may take longer. However you can cancel the image export at any time.

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Options

Chapter 16

You can access the various program settings in the *Options* dialog window via the Options... menu item on the Tools menu.

16.1 General

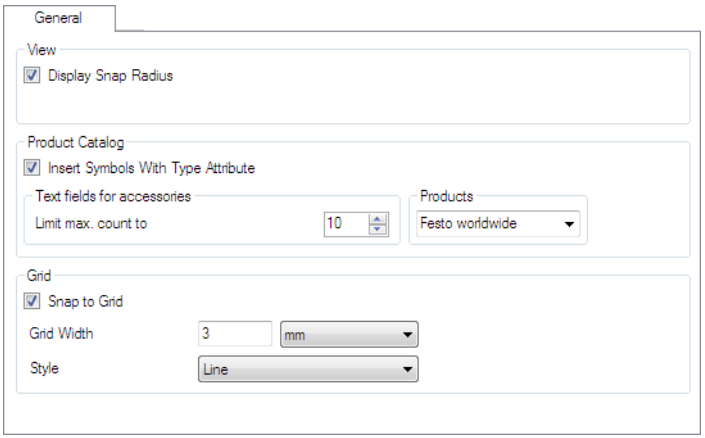

Figure 16/1: *Options* dialog window: *General* tab

View

In order to simplify connection of connectors FluidDraw draws a small circle around the connectors on the circuit symbols. Deactivate the *Display Snap Radius* option in order to disable the display of the snap-in circles.

Product Catalog

Activating the "*Insert Symbols With Type Attribute*" option causes a text field to be added with the circuit symbol which contains a link to the attribute with the type designation of the product when components are inserted from the Festo product catalogue.

Text fields for accessories

When inserting accessories without symbols texts with the type designation of the products are displayed. Here you can limit the number of text fields inserted.

Products

Specifies which products from the Festo product catalogue are to be used, for example *Europe* or *Festo worldwide*.

Grid

Here you can set the grid width and the style. To display the grid select the Show Grid menu item on the View menu.

As well as absolute values such as “mm” you can also specify the relative basic unit of length “M”.

16.2 Save

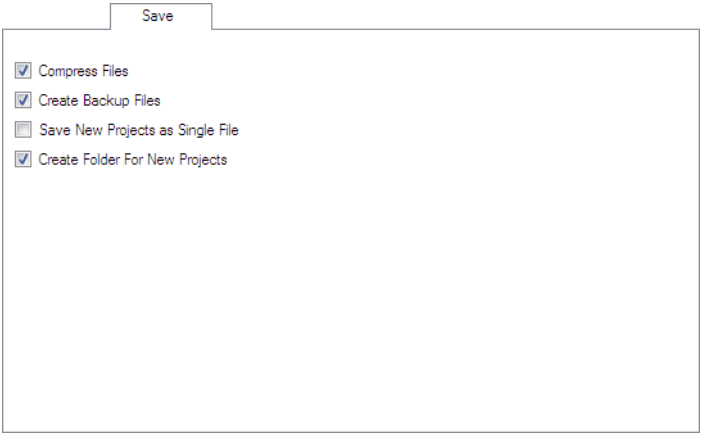

Figure 16/2: *Options* dialog window: *Save* tab

Compress Files

FluidDraw normally compresses the saved files in order to save space on the disk. If you deactivate the option the files are saved as XML files without compression. You can find further information in theCircuit files section.

Create Backup Files

The “*Create Backup Files*” option causes the previous versions of saved files are created with the **bak** file suffix. This enables you to restore previous versions.

Save New Projects as Single File	Project files generally consist of links to the files contained therein. However, where desired FluidDraw can also save the project along with all of the associated circuit files in one single file. This serves to simplify passing on or archiving the project, among other things. You can set whether a project saves links or all of the associated files using the *Project* dialog window – Properties of the project. This option defines the default setting for new projects.
Create Folder For New Projects	A folder with the project name where all project files are stored is automatically generated when a new project is created if this option is active.

16.3 Folder Locations

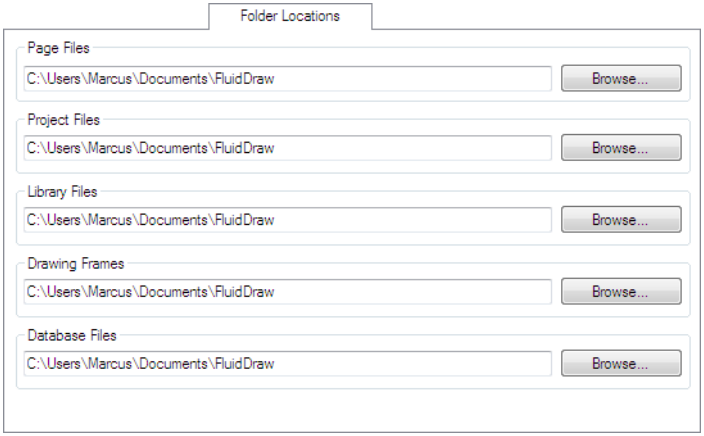

Figure 16/3: *Options* dialog window: *Folder Locations* tab

Page Files	This is the default path for opening and saving circuits.
Project Files	This is the default path for opening and saving projects.
Library Files	This is the default path for opening and saving libraries.

Drawing Frames	This is the default path for opening and saving drawing frames.
Database Files	This is the default path for opening and saving database files.

16.4 Language

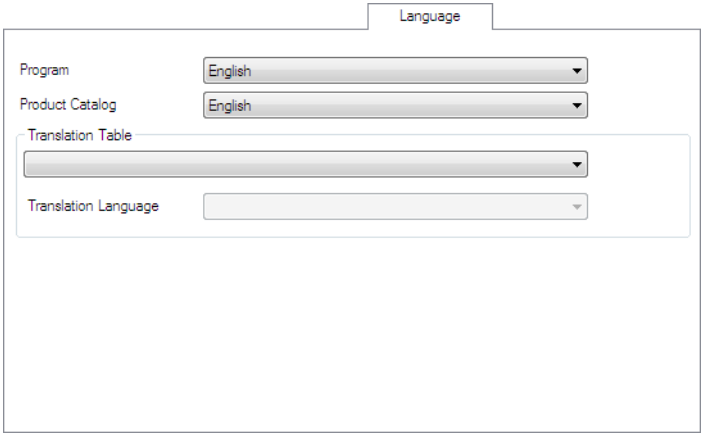

Figure 16/4: *Options* dialog window: *Language* tab

Program	Defines the languages for the program interface including dialog windows and messages.
Product Catalog	Defines the language used for the Festo product catalogue.
Translation Table	Defines the translation table to be used.
Translation Language	Defines the language from the selected translation table to be used.

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16.5 Dimension

This tab is used to define the default settings for the dimensions. You can find further information under Dimension.

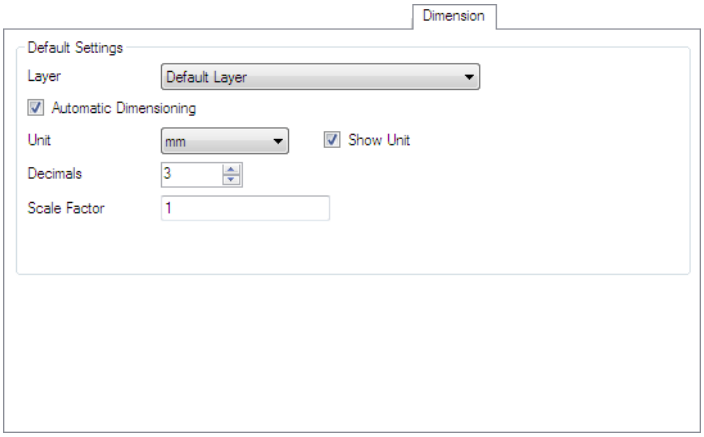

Figure 16/5: *Options* dialog window: *Dimension* tab

All of the settings are only applied to newly generated dimensions. They have no effect on existing dimensions in the circuit.

Layer	Defines the drawing layer where the newly generated dimensions are placed.
Automatic Dimensioning	Activates and deactivates automatic dimensioning. If this option is activated then the displayed dimension value is automatically adapted if the dimension is scaled.
Unit	Defines the unit to be used for the dimension.
Show Unit	Defines whether the unit should be displayed.
Decimals	Defines the number of decimal places.

Scale Factor

Determines the factor by which the real length is multiplied for the displayed value. This is necessary if you are creating a drawing with a scale other than 1:1.

16.6 Designation Conventions

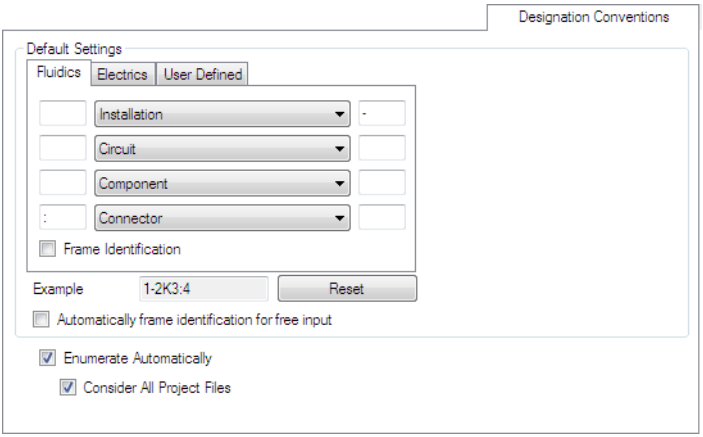

Figure 16/6: *Options* dialog window: *Designation Conventions* tab

This tab is used to define the default settings for the designation conventions. You can find further information under Equipment identifications and designation conventions.

The settings are only applied to newly generated projects or circuits. They have no effect on existing objects.

Settings can be made for the following sets of conventions: *Fluidics*, *Electrics* and *User Defined*.

Frame Identification

Defines that the identifications produced by the selected set of conventions will be framed.

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Enumerate Automatically

Defines that the identifications of newly inserted symbols will be automatically numbered. All of the project files and not just the current circuit will be taken into consideration for the numbering if *Consider All Project Files* is active.

16.7 Cross Reference Representation

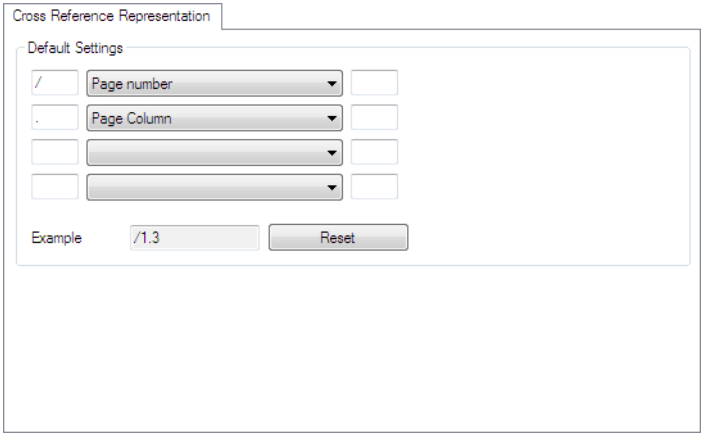

Figure 16/7: *Options* dialog window: *Cross Reference Representation* tab

This tab is used to define the default settings for the cross-reference representation. You can find further information under Cross-reference representation.

The settings are only applied to newly generated projects or circuits. They have no effect on existing objects.

Example

Illustrates the effects of the settings using an example.

Reset

Resets the settings to the settings defined in FluidDraw.

16.8 Connector Links

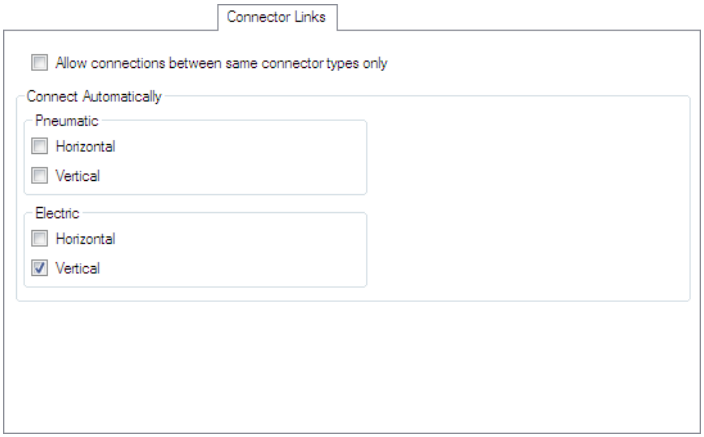

Figure 16/8: *Options* dialog window: *Connector Links* tab

Allow connections between same connector types only	Only connectors of the same type can be connected if this option is active. For example a line from an electric connector to a pneumatic connector cannot be created in this case.
	FluidDraw supports theautomatic connection of connectors. The following settings define which connections should be automatically created.
Pneumatic – Horizontal	Pneumatic connectors that are on one horizontal line will be automatically connected when a symbol is inserted or moved.
Pneumatic – Vertical	Pneumatic connectors that are on one vertical line will be automatically connected when a symbol is inserted or moved.
Electric – Horizontal	Electric connectors that are on one horizontal line will be automatically connected when a symbol is inserted or moved.
Electric – Vertical	Electric connectors that are on one vertical line will be automatically connected when a symbol is inserted or moved.

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16.9 Warnings

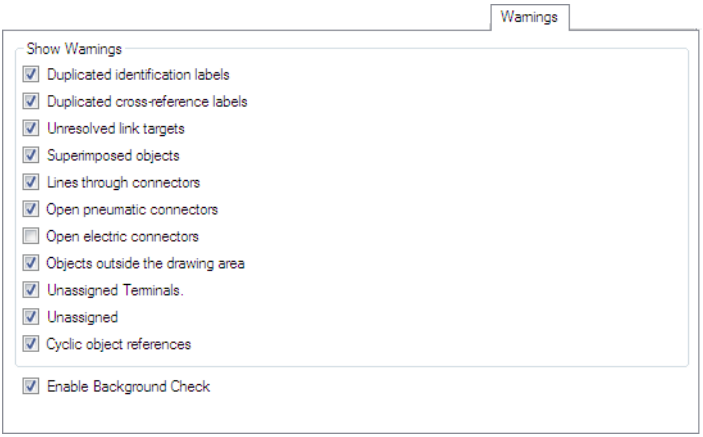

Figure 16/9: *Options* dialog window: *Warnings* tab

Show Warnings

Different types of warnings that FluidDraw should or should not deliver can be activated and deactivated here. These warnings include "*Duplicated identification labels*" and "*Superimposed objects*".

Enable Background Check

All of the circuits will be checked during editing if this option is active. Only the criteria that would lead to the warnings specified under "*Show Warnings*" are checked. Objects that caused an error are highlighted in red in the circuit. If this option is not active then the check must be initiated manually using the Page – Check Drawing menu.

16.10 Automatic Updates

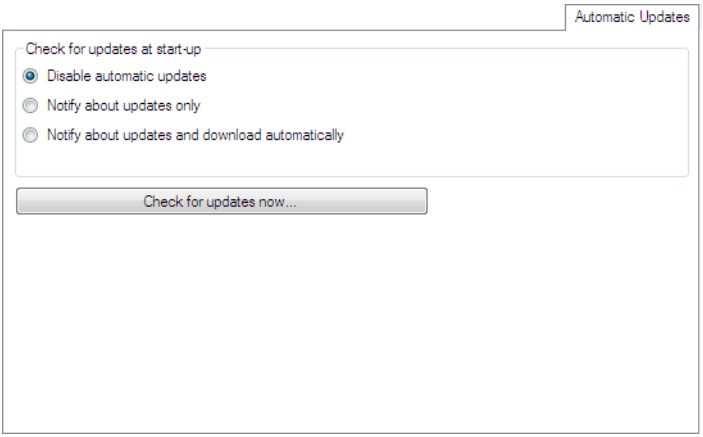
Automatic Updates
Check for updates at start-up
Disable automatic updates
Notify about updates only
Notify about updates and download automatically
Check for updates now...

Figure 16/10: *Options* dialog window: *Automatic Updates* tab

Check for updates at startup	FluidDraw can search on the Internet for a new version when the program starts. You can activate or deactivate the automatic search here.
Check for updates now...	As soon as there is an Internet connection you can use this button to initiate the search for a new FluidDraw version.

16.11 Text Sizes

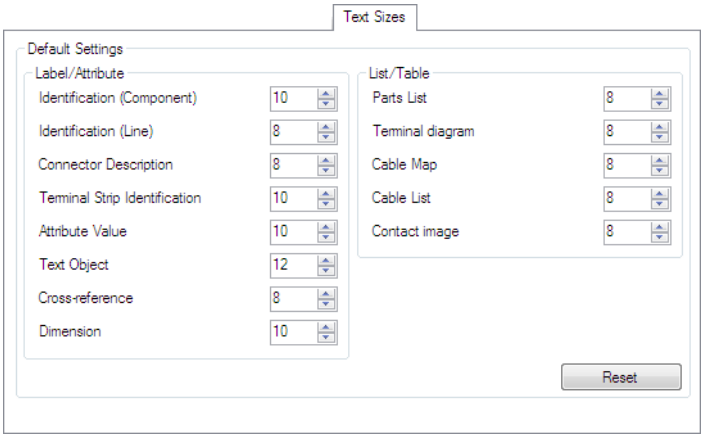

Figure 16/11: *Options* dialog window: *Text Sizes* tab

This tab defines the font sizes to be used for objects newly inserted into the circuit diagram.

Label/Attribute — This group lists the font sizes used for identifications and cross-references, etc.

List/Table — This group lists the font sizes used for analyses and tables.

Chapter 17

17.1 File

New

New / File...

Opens a new window for creating a new circuit drawing.

New / Project...

Opens the dialog window for creating a new project.

Open

Open / File...

Opens a new window for selecting an existing circuit drawing.

Open / Project...

Opens the dialog window for selecting an existing project.

Add

Adds files, etc. to the active project.

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Add / New Page...

Creates a new circuit file and adds it to the active project.

Add / New Parts List...

Creates a new parts list and adds it to the active project.

Add / Existing Files...

Opens the dialog window for selecting existing files to be added to the active project.

Close

Closes the active window or project, etc.

Close / File...

Closes the active window.

Close / Project...

Closes the active project.

Save File

Saves the circuit diagram in the active window to disk.

Save File As...

Saves the circuit diagram in the active window to disk under a new name.

Save Project

Saves the active project.

Save Project As...

Saves the active project under a new name on the data storage medium. Files that are within the project folder are duplicated while references to external files are left. With external file references you must therefore consider that changes to these files affect all projects containing them.

Save as Component Library...

Saves the active project as a library. As a result a new library symbol is generated for every circuit. The new library bears the name of the project with the **`lib`** file suffix.

DXF Import...

Opens the dialog window for selecting a saved DXF file. The selected file is subsequently converted into a FluidDraw circuit diagram. The original file remains unchanged.

Export...

Exports the circuit diagram in the active window to the data storage medium as a BMP, JPG, GIF, WMF, PNG, DXF or TIF file.

Page Setup...

Sets up the printer properties for a page to be printed.

Print Preview

Opens a print preview as a page view.

Print...

Opens the FluidDraw *Print* dialog window to set the print options for the active circuit.

Recent Files

A file can be selected for opening from a list of the recently opened files.

Recent Projects

The most recently opened projects can be selected for opening from a list.

Exit

Ends FluidDraw.

17.2 Edit

Undo

Undoes the last editing action for the active circuit.

Redo

Takes back the last undo-action for the active circuit.

Cut

Deletes the selected objects and adds them to the clipboard.

Copy

Copies the selected objects to the clipboard

Paste

Pastes the objects from the clipboard into the active circuit.

Delete

Deletes the selected objects from the active circuit.

Select All

Selects all of the objects from the active circuit.

Group

Groups the selected objects.

Create Macro Object

Creates a macro object out of the selected objects.

Create Cross-reference

Creates a cross-reference.

Ungroup/Break Off

Ungroups the selected groups or macro objects.

Enable Scale

Activates or deactivates the “enable scaling” mode which enables the scaling of symbols with the help of the mouse pointer.

Enable Rotate

Activates or deactivates the “enable rotate” mode which enables the rotation of symbols with the help of the mouse pointer.

Edit Poly Line

Activates or deactivates the “Edit Polyline” mode that allows you to edit a polyline.

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Align

Aligns the selected objects with each other.

Rotate

Rotates the selected objects by 90, 180 or 270 degrees anti-clockwise. Grouped objects are rotated around the center point of the group rectangle.

Mirror

Mirrors the selected objects horizontally or vertically. Grouped objects are mirrored along the axis of the group rectangle.

Delete Connector

Deletes the selected component connector.

Properties...

Opens the *Properties* dialog window for the selected circuit symbols in order to enter the component properties. This also enables you to carry over attributes from the Festo product catalogue.

The *Connector* dialog window is opened for the selected component connector enabling you to enter the connector propertiest.

When a line segment is highlighted a dialog window opens enabling you to enter the line properties.

If multiple objects are selected then a dialog window with a limited selection of properties appears. It only contains those properties which affect all of the selected objects.

17.3 Insert

Find Symbol Description...

Opens the search dialog for selecting a symbol via its appearance or its description.

From Festo Catalog...

Opens the Festo product catalogue to select a component via the product features.

From Festo Shopping Basket...

Opens the Festo product catalogue to transfer components from an existing shopping cars.

From File...

Opens the dialog window for selecting an existing text file in CSV format which was created by an export from the Festo product catalogue.

From Custom Database

Opens a dialog window similar to the Festo product catalogue for selecting a component via the product properties. It is not the database of the Festo product catalogue that is used, however, but the selected user database.

Conduction Line...

Opens a dialog window that defines the settings for one or more conduction lines that are to be inserted in the circuit diagram after the dialog window is confirmed.

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Define Connector...

Creates a new component connector the next time the left mouse button is clicked in a circuit symbol.

Interruption/Potential...

Adds an interruption or an electric potential to the circuit diagram.

Parts List

Inserts a parts list into the circuit diagram.

Terminal

Inserts a terminal into the circuit diagram.

Multiple Terminals...

Inserts multiple terminals into the circuit diagram.

Terminal diagram

Inserts a terminal diagram into the circuit diagram.

Cable

Inserts a cable into the circuit diagram.

Cable Map

Inserts a cable map into the circuit diagram.

Cable List

Inserts a cable list into the circuit diagram.

17.4 Draw

This menu contains functions for freely drawing graphical elements such as lines, rectangles, circles, etc as well as for inserting texts and images.

Line

Draws a line by defining two defined end points.

Poly Line

Draws a polyline by defining the vertices with successive mouse clicks. The drawing operation can be cancelled by pressing the Esc key or clicking the right mouse button. The last vertex must be set with a double-click.

Rectangle

Draws a rectangle by defining two diagonally opposite corner points.

Circle

Draws a circle by defining a middle point and a radius.

Ellipse

Draws anellipse by defining a middle point and a radii on parallel axes.

Text

Inserts a text at the mouse position.

Picture

Inserts an image at the mouse position.

Dimension

Inserts a dimension symbol.

17.5 Page

Check Drawing

Checks the active circuit drawing for drawing errors.

Paper Size...

Opens a dialog window enabling you to set the paper size.

Language...

Opens a dialog window enabling you to set the circuit language.

Renumber Designations...

Opens a dialog window enabling you to interactively renumber the symbol identifications.

Manage Terminal Strips...

Opens a dialog window enabling you to manage the terminal strips in the circuit.

Manage Cables...

Opens a dialog window enabling you to manage the cable objects in the circuit.

Properties...

Opens an dialog window enabling you to set the circuit properties.

17.6 Project

Add Current Window

Adds the active window to the file list of the open project.

Remove Current Window

Removes the active window from the file list of the open project.

Manage Terminal Strips...

Opens a dialog window enabling you to manage the terminal strips in the project.

Manage Cables...

Opens a dialog window enabling you to manage the cable objects in the project.

Manage Cross References...

Opens a dialog window enabling you to manage the cross-references in the project.

Properties...

Opens the dialog window for entering the project properties.

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17.7 View

Circuit Diagram

Switches from the parts list view to the circuit diagram view.

Parts List

Switches to the parts list view.

Library

Shows or hides the libraries window.

Project

Shows or hides the window for managing the project files.

Standard Size

Displays the circuit diagram in its original size.

Previous View

Displays the previous view of the circuit diagram. Repeatedly activating this function switches back and forth between the views previously used.

Fit to Window

Set the zoom level to fit the entire circuit diagram into the window.

View Detail

Defines the new view by drawing a rectangle while holding down the left mouse button.

Zoom In

Zooms the view of the circuit diagram in by one step. Three steps correspond approximately to doubling the zoom factor.

Zoom Out

Zooms the view of the circuit diagram out by one step. Three steps correspond approximately to halving the zoom factor.

Show Page Borders

Shows or hides the page borders in the form of a red rectangle. This rectangle displays the borders of the paper format defined on the Paper Size... menu. Using the print preview you can decide whether and how the drawing is distributed among multiple sheets when printing.

Show Grid

Shows a background grid in the active circuit window. The grid settings can be made in the *General* tab under the Options... menu item from the Tools menu.

Show Rulers

Shows or hides the rulers in the active circuit window.

Show Page Dividers

Shows or hides the page dividers in columns and rows. Cross-references can refer to the column and row containing a symbol. The position and number of the columns and rows can be interactively defined via the page dividers shown.

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Show Connector Descriptions

Shows or hides the connector descriptions. The *Display* option can be selected in the properties dialog window for the connectors. This option is only evaluated if "Individual" was selected.

Show Connector Descriptions / All

Shows all connector descriptions regardless of the settings at the connectors.

Show Connector Descriptions / Individual

Shows only the connector descriptions for those connectors with the *Display* option activated.

Show Connector Descriptions / None

Hides all connector descriptions regardless of the settings at the connectors.

Show Terminal Directions

Shows or hides the direction arrows at the terminals. The tip of the arrow points into the control cabinet here.

Show Terminal Directions / All

Shows all arrows regardless of the settings at the terminals.

Show Terminal Directions / Individual

Shows only the arrows for those terminals with the *Show Direction* option activated.

Show Terminal Directions / None

Hides all arrows regardless of the settings at the terminals.

Display Contact Images

Shows or hides the contact images.

Drawing Layers...

Opens a *Drawing Layers* dialog window enabling you to set the properties of the drawing layers.

17.8 Library

Add New Library...

Creates a new library.

Add Existing Library...

Opens the dialog window enabling you to select a saved library file with the **`lib`** file suffix. The library saved in the file is added to the library window.

Add Existing Symbol Folder...

Opens the dialog window for selecting an existing folder. The entire contents of the selected folder, including all of the circuit symbols and sub-folders contained therein are displayed as a library.

Close Current Library

Removes the active library from the list in the library window. The library file is not deleted by this action and can be opened again using the Library menu and the Add Existing Library... menu item.

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Rename Active Library...

Opens a dialog window for entering the name of the library. This function is only available to libraries which the user has created. For write-protected libraries the folder name is shown in the tab.

Sort Current Library Alphabetically

Sorts the contents of the active library alphabetically. This function is only available to libraries which the user has created. Write-protected libraries are automatically sorted and cannot be resorted by the user.

17.9 Tools

Options...

Opens the dialog window with program settings, file paths and language options.

Custom Product Databases...

Opens a dialog window for managing custom product databases.

Translation Tables...

Opens a dialog window for managing translation tables.

Restore Defaults...

Resets the program settings to the default values. This enables you to undo unintentional settings made.

Note: Use this function if you feel that FluidDraw is behaving unexpectedly or files and windows have suddenly disappeared.

17.10 Window

New Window

Opens a window with an additional view of the active window.

Navigation Pane

Opens an overview window with a scaled-down view of the entire circuit diagram. The currently visible area of the active window appears as a white area. The non-visible area of the drawing is shaded grey. By drawing a rectangle in the overview window with the mouse pointer you can define the section of the circuit diagram displayed in the active window. Simply left-clicking on the overview window moves the visible area while retaining the zoom level.

Cascade

Arranges the windows so that they overlap.

Tile Horizontally

Arranges the windows into horizontal tiles.

Tile Vertically

Arranges the windows next to each other.

Close All

Closes all open windows.

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17.11 Help

Contents

Displays the contents of the FluidDraw help pages.

Index

Displays the index of the FluidDraw help pages.

Search

Displays the search dialog for the FluidDraw help pages.

Check for updates...

As soon as there is an Internet connection you can use this menu item to initiate the search for a new FluidDraw version.

About...

Displays the FluidDraw program information.

Functional diagram

Chapter 18

You can find the function diagram in the standard FluidDraw library. You can apply the functions from the Edit menu to the function diagram. Double-click the function diagram or open the *Functional diagram* using the Properties... menu item on the Edit menu.

The buttons in the upper toolbar of the editor are for editing a function diagram. The following six buttons determine the editing mode:

Edit Mode

Draw diagram curves

Insert signal elements

Insert text boxes

Draw signal lines and insert signal connections

Insert additional signal lines

The selected mode is highlighted in white or displayed as a pressed button. shows that signal lines can be drawn in the diagram area by clicking, for example.

If you hover the mouse pointer over a button for a short period of time then a short description is displayed.

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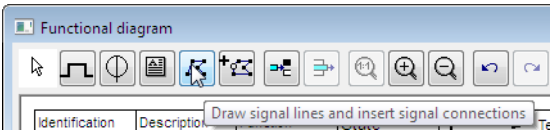


18.1 Edit Mode

This mode serves to adjust the objects in the function diagram. Elements in the diagram can be moved. Changing the size of text boxes is only possible in this mode.

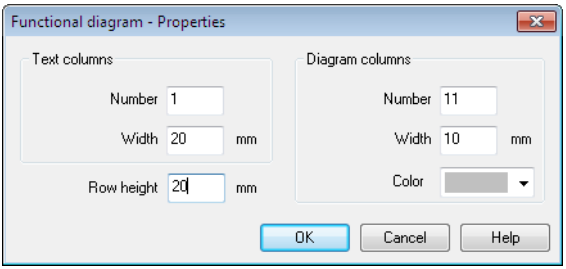
Movement and dragging operations can be cancelled using the Esc key.

If the mouse pointer is moved outside the window area while the left mouse button is held down the view automatically scrolls.

Double-clicking on a diagram element (diagram row, text box, signaling element, etc.) opens a dialog window in which you can make the desired adjustments.

18.1.1 Set diagram properties

Clicking on the Eigenschaften... button opens a dialog window in which you can set the diagram properties.



Text columns – Number	If the number of text columns is changed than all of the table text boxes are distributed horizontally and evenly.
Text columns – Width	If the width of the text columns is changed than all of the table text boxes are distributed horizontally and evenly.
Diagram columns – Number	The diagram columns are located on the right-hand side of the function diagram. The diagram curves can be drawn in this area. The number of diagram columns can also be changed by dragging the mouse pointer to the right-hand edge of the diagram.
Diagram columns – Width	
Color	The color which the grid lines are drawn in the diagram area.
Row height	Defines the row height of all of the rows.

18.1.2 Table textboxes

The table textboxes are located on the left-hand side of the function diagram.

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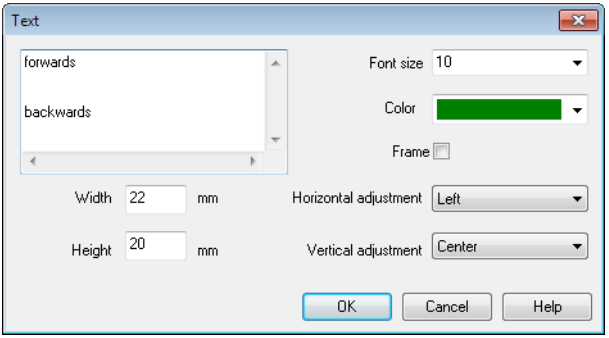
Identification	Description	Function	State

Double-clicking on a table textbox opens the corresponding dialog window.

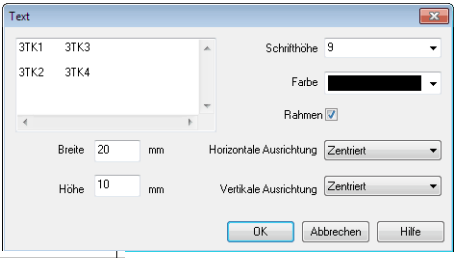


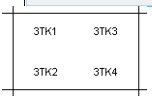
Font size	The font size of the text to be shown.
Color	A selection from sixteen standard colors for the text to be displayed.
Width	The width of the selected table column can be changed by dragging the mouse pointer.
Height	The height of the selected table column can be changed by dragging the mouse pointer.
Horizontal adjustment	The following alignment options are available: "*Left*" "*Center*" and "*Right*".
Vertical adjustment	The following alignment options are available: "*Top*", "*Center*" and "*Bottom*"
Alignment within a table cell	If a text within a textbox should resemble a table then set a tab stop between the text parts. The text is displayed in the textbox in accordance with the number of tab stops and the specified horizontal

and vertical alignment. To enter tab stops hold down the Ctrl key.

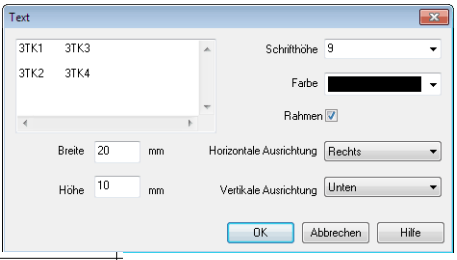
Examples:

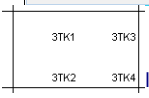
1.





2.





Insert text boxes

18.1.3 Adjust the presentation of the diagrams

The area in which curves can be drawn is located on the right-hand side of a diagram row.

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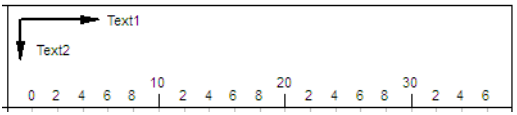
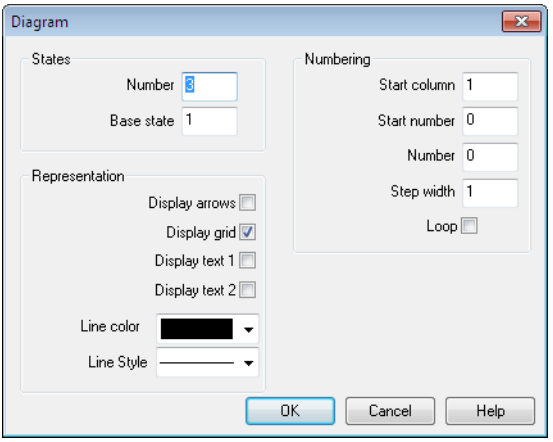


Double-clocking on this area opens a corresponding window in which you can define the appearance of the drawing area. Please ensure that no diagram element, such as a signaling element, for example, is underneath the mouse pointer.

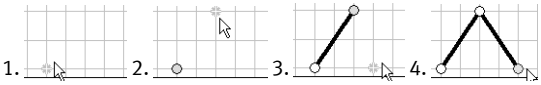


States – Number	The entry defines the number of states and thus the number of horizontal lines in the diagram row.
States – Base state	Horizontal lines are drawn through the base state with a thin pencil.
Numbering – Start column	The start column defines which column the numbering should begin with.
Numbering – Start number	The start number defines which number the numbering should begin with.
Numbering – Number	The number specified who many steps need to be numbered.
Numbering – Step width	Defines the step width between two numbers.

Numbering – Loop	If this field is selected then an equals sign and the start number are always displayed after the last number.
Representation – Display arrows	If this field is selected then two arrows are displayed.
Representation – Display grid	If this field is selected then the background grid is displayed.
Representation – Display text 1	If this field is selected then a textbox is shown which can serve as a label. This textbox belongs to the selected row and cannot be moved to another row.
Representation – Display text 2	If this field is selected then an additional textbox is shown which can serve as a label. This textbox belongs to the selected row and cannot be moved to another row.
Representation – Line color	Sets the color of the diagram lines.

18.2 Draw diagram curve

In this mode diagram curves can be drawn. Supporting points can only be inserted on the grid. A supporting point is drawn at every left-click.



If you hold down the left mouse button then supporting points can be moved as in the selection mode.

Selected supporting points are shown in grey. Use the Del key to delete a selected symbol.

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18.3 Insert signal elements

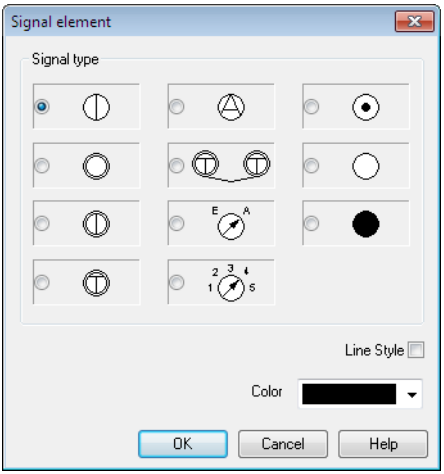
In this mode signaling elements can be inserted by left-clicking.

1. 2.

If you hold down the left mouse button then signaling elements can be moved as in the selection mode.

Selected signaling elements are shown in grey. Use the Del key to delete a selected signaling element.

Double-clicking on a signaling element in the selection mode opens a dialog window in which you can modify how the signaling element is shown.



Signal type

Display description	If this field is selected then a text is shown which can serve as a label for the signaling element.
Color	The signaling element is displayed in this color.

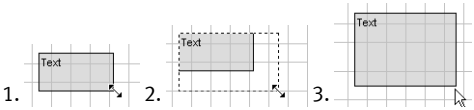
18.4 Insert text boxes

In this mode textboxes can be inserted by left-clicking.

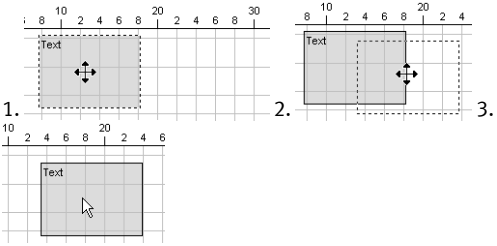
Selected textboxes are shown in grey. Use the Del key to delete a selected textbox.

In "*Edit Mode*" the size and position of a textbox can be changed using the mouse pointer.

Adjust size:



Move textbox:



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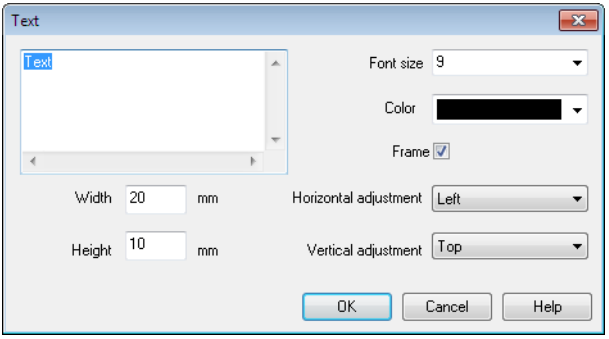
Double-clicking on a textbox in the selection mode opens a dialog window in which you can modify how the textbox is shown.



Font size	The font size of the text to be shown.
Color	A selection from sixteen standard colors for the text to be displayed.
Frame	If this field is selected then a frame is drawn around the textbox.
Width	The width of the textbox.
Height	The height of the textbox.
Horizontal adjustment	The following alignment options are available: "*Left*", "*Center*" and "*Right*".
Vertical adjustment	The following alignment options are available: "*Top*", "*Center*" and "*Bottom*"

Table textboxes

18.5 Draw signal lines and insert signal connections

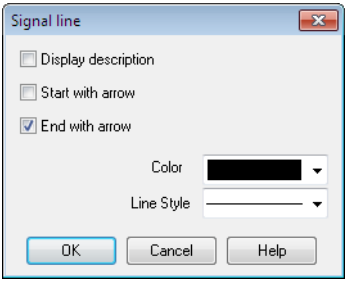
In this mode signal lines can be drawn freely or automatically laid from signaling elements.

18.5.1 Free-draw signal lines

An additional supporting point is set with every left-click. The process ends when you click the current line while holding down the Ctrl key, press the Esc key or switch the editing mode. Use the Del key to delete a selected signal line. If only a supporting point is selected then only this is removed from the line.

In "*Edit Mode*" the supporting points belonging to the signal lines can be moved. If the Shift is held down while setting or moving supporting points then the supporting point is vertically or horizontally aligned.

In the selection mode double-clicking can change the way the line is displayed.



Display description

A framed label on the line and a label next to the framed label is shown. The framed label can be moved freely along the line. The additional label can be moved freely.

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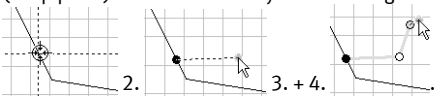
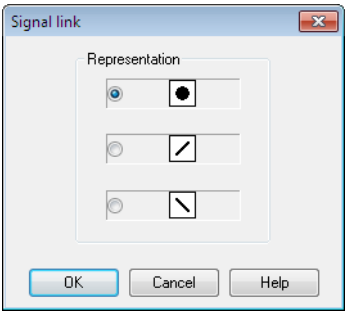
Start with arrow	An arrow is displayed at the beginning of the line. The arrow can be moved freely along the line.
End with arrow	An arrow is displayed at the end of the line. The arrow can be moved freely along the line.
Color	Line color

If you click a finished signal line to activate the “Freely move signal lines” mode then a signal logic is inserted. This logic point (snap point) can then be freely moved along the line 1.

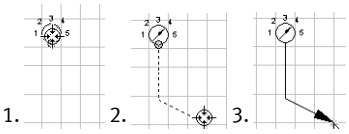


In the selection mode you can change how the signal logic is displayed by double-clicking on it.



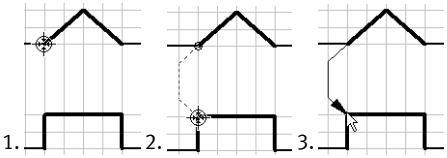
18.5.2 Drawing signal lines from signals

In the “Freely draw signal lines” signal lines can be drawn from signals. Left-click a signal and hold down the mouse button. Drag the mouse pointer to a position which you have selected as the end point of a signal line. The signal line will be drawn once you release the mouse button.



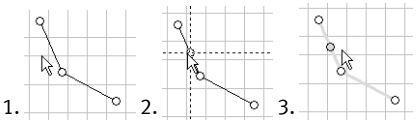
18.5.3 Draw signal lines from diagram support points

In the “Freely draw signal lines” mode signal lines can be drawn from curve support points. Left-click a supporting point and hold down the mouse button. Drag the mouse pointer to a second supporting point. The signal line will be drawn once you have the mouse pointer over the second supporting point and release the mouse button.



18.6 Insert additional signal lines

In the “*Insert additional signal lines*” mode additional supporting points can be inserted into existing signal lines.



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18.7 Insert row

Clicking on the "*Insert row*" button inserts a new diagram row above the current selection. If no cell is market then a new row is attached to the end of the diagram.

18.8 Delete row

Clicking on the "*Delete row*" button deletes a selected diagram row. If nothing is selected then the function is not available.

18.9 Additional editing functions

18.9.1 Zoom

Using the button the view is reset to the standard zoom level.

Using the button increases the zoom level.

Using the button decreases the zoom level.

18.9.2 Undo editing steps

Using the button you can undo the last 50 editing steps.

Using the button you can redo the previously undone editing steps.

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Index

?

? Menu ____ 215

A

Accessories ____ 188
Alignment ____ 42
Alignment lines ____ 54
Analyses ____ 130
Archiving
  project ____ 139
Attribute link ____ 123

B

Backup copies ____ 189
Blanking plugs ____ 34
BMP
  export ____ 185

C

Cable ____ 157, 160
  manage ____ 161
Cable list ____ 164
Cable List ____ 165
Cable map ____ 162
Cable Map ____ 163
Check
  drawing ____ 78
Circle ____ 73
Circuit ____ 17
  check ____ 78
  input ____ 183
  nodes ____ 139
  open ____ 139
  output ____ 183
  print ____ 183
  properties ____ 139, 143
  XML file ____ 17

Circuit menu ____ 207
Component attributes ____ 105
Compression
files ____ 189
Conduction lines ____ 153
Configurable cylinder ____ 39
Configurable way valves ____ 37
Connector
connect ____ 24
define ____ 36
delete ____ 37
identification ____ 34
properties ____ 34
seal ____ 34
Connector Labels ____ 118
Contact ____ 115
Contact images ____ 182
Create drawing frame ____ 46
Cross Reference Representation ____ 61
Cross-reference
create from symbol ____ 60
Cylinder
configure ____ 40
Cylinder editor ____ 40

D

Define page dividers ____ 51
Delete
line ____ 34
Designation conventions ____ 98
Designations
number ____ 100
Dialog window
cable ____ 157, 160
Cable List ____ 165
Cable Map ____ 163
circle ____ 73
circuit ____ 143
Circuit ____ 9
component ____ 106
connector ____ 35
contact ____ 115
Cross Reference Representation ____ 61
diagram properties ____ 218

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diagram size 9
dimensioning 96
drawing areas 221
drawing frame 48, 50
drawing layers 57
electric line 33
electric terminal 168
ellipse 75
export parts list 136
Functional diagram 217
image 77
line 33, 69
line options 226
Manage Cross References... 62
pneumatic line 33
polygonal chain 70
polyline 70
print 184
project 143
rectangle 72
secondary component 115
set multiple terminals 170
set of connected lines 70
signal logic 227
signaling elements 223
Terminal diagram - Properties 175
text 121
text options 219
wiring 157
Dimension 95
Dimensioning 95
Draw menu 206
Drawing element 62
Drawing frame 46, 47
import 46
insert 47
label 46
Drawing level 56
DXF
export 185
DXF file
import 185

E

Edit
circuit 20
Edit menu 201
Electric line 66
Ellipse 74
Equipment identifications 98
Export 185

F

Festo product catalogue 20
File menu 198
Find target 131

G

GIF
export 185
Graphical element 62
Grid 54
Grid dimension 54
Grid options 188
Group 41
create 41
delete 42
Guides 54

H

Hide
automatic 18
Hide window 18

I

Image 76
Image file 76
Insert
Symbol 13
Insert menu 204
Insert T distributor 27
Interruption 64

J

JPG
export 185

L

Language text
search 88
Layer 56
Libraries 12
Library 15, 18
Library menu 212
Library window 18
Line 68
delete 34
electric 66
move 30
pneumatic 66
Line segment 30
Line type
set 32
Link 123
Links 178

M

Macro object
create 41
delete 42
Manage Cross References... 62
Menu 198
circuit 207
draw 206
edit 201
file 198
insert 204
library 212
project 208
tools 213
view 209
window 214
Menu. ? 215
Mirror 42, 44

O

Object snap 55
Options
Automatic Updates 196
Connector Links 194

Cross Reference Representation 193
Designation Conventions 192
Dimension 191
Folder Locations 189
General 187
Grid 188
Language 190
Save 188
text fields 188
Text Sizes 197
Warnings 195

P

Page dividers 147
Parts list 130
display 131
edit 131
export 135
find components 131
find target 131
nodes 139
open 139
print 183
properties 133
sort 131
Pilot line 32
Pneumatic line 66
PNG
export 185
Polygonal chain 70
Polyline 70
Port
connect 24
Potential 64
Potentials 153
Predefined attributes 146
Predefined placeholders 146
Predefined variables 146
Print 183
Product catalogue 20
Project 18, 137
add 138
node 138
print 183

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properties 143
remove 138
Project archiving 139
Project menu 208
Project window 18
Properties 143
Properties dialog window 9
cable 160
Cable List 165
Cable Map 163
cable symbol 157
circle 73
circuit 143
component 106
connector 35
contact 115
Cross Reference Representation 61
cylinder 40
dimensioning 96
drawing layers 57
electric line 33
electric terminal 168
ellipse 75
image 77
line 33, 69
Manage Cross References... 62
pneumatic line 33
polygonal chain 70
polyline 70
project 143
rectangle 72
secondary component 115
set multiple terminals 170
set of connected lines 70
Terminal diagram - Properties 175
text 121
way valve 38
wiring 157

R

Rectangle ____ 71
Rotate ____ 43

S

Scale ____ 44
Search
  Symbol ____ 14
Secondary component ____ 115
Set of connected lines ____ 70
Show
  automatic ____ 18
Show window ____ 18
Silencers ____ 34
Snap ____ 55
Storage locations ____ 189
Symbol
  align ____ 42
  group ____ 41
  insert ____ 20
  mirror ____ 42, 44
  move ____ 20
  rotate ____ 43
  scale ____ 44
Symbol library ____ 15
Symbols ____ 12

T

T distributor
  set ____ 36
Terminal ____ 168
Terminal diagram - Properties ____ 175
Terminals ____ 170
Text ____ 76
Text attribute ____ 123
Text components ____ 120
Text ID
  search ____ 88
Text link ____ 123
TIF
  export ____ 185
Tiles
  Printout ____ 9

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Toolbar
drawing 62
Tools menu 213

V

Valve editor 38
View menu 209

W

Way valve
configure 38
Window menu 214
Wiring 157
WMF
export 185
Working line 32

X

XML file 17